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[OFFICIAL NOTICE.]

Experience Section, Pacific Coast Gas Association.

OFFICE OF THE EXPERIENCE EDITOR,
ROOM 610, 445 SUTTER STREET,
SAN FRANCISCO, CAL., June 26, 1910.

To the Members of the Pacific Coast Gas Association: Someone has said that "Education is not the result of a course of study; it is the result of a course of experience." And the Editor of your Experience Department, whom you honored by that appointment at the last meeting, would like to have you share with him a bit of experience that has helped to make you successful, so that he can tell it to the Association at the Los Angeles meeting, which is so near at hand—September 20, 21 and 22. The name of the sender will be treated confidentially, if so desired. Faithfully yours,

LEON B. JONES, Editor.

BRIEFLY TOLD.

THE MEETING OF THE MICHIGAN GAS ASSOCIATION.—That bundle of nervous energy, going through high-tides of business with a dart and a swish, who signs himself Secretary and Treasurer of the Michigan Gas Association (Mr. Glenn R. Chamberlain) informs us that everything is in readiness, even at this early date, for the Michigan Association meeting, set for the 9th to the 12th prox. The good steamer "St. Ignace," well-remembered from that glorious trip of last September, big and roomy as she is, cannot be called an ark, in respect of her accommodations, wherefore, Secretary Chamberlain asks that those who propose to make the voyage, to and over magnificent Georgian Bay, should apply at once for their quarters. The entire expenditure will be $30 per person, which is an aside sum to secure "the trip of a lifetime," all service paid. Those who have not made terms with the Michigan's blonde clerical chief, should do so at once. His headquarters are with the Grand Rapids (Mich.) Gas Light Co.

CURRENT MENTION.—

THE profit sharing plan, originally put in action by the Boston Consolidated Gas Company in 1906, has benefited the employees in uncommon degree. The last apportionment (made late last month) amounted to $47,313.94, which was divided amongst 584 men, of which number 439 were on the books as holders of Massachusetts Gas Companies preferred stock, in which security the apportionments are made.

THE capital stock of the Austin (Tex.) Gas Light Company has been increased an additional $25,000, making the total to date equal $350,000.

THE Pacific Gas and Electric Company has entered into an agreement with the International Brotherhood of Gas and Electrical Workers, under which the former agrees to employ only members of the I. B. E. W., thus putting the corporation on the closed shop system for a period which terminates November 30, 1911. The increases are: Linemen, 25 cents, and foremen, 50 cents, per diem; "ordinaries," from $5 to $10 per month, according to their classifications. The agreement, it may be further added, is dated back to June 1st, and the effect of the additions will be to increase the Company's payroll on labor account not far from $150,000 per annum.

THE connecting-up of the pipe system between The Meriden (Conn.) Company's works and the outlying Cheshire district was completed last week.

THE directors of the Leominster (Mass.) Gas Light Company on the 27th prox., rather stumped the town authorities through sending of communication to the latter of a letter, the main portion of which consisted of this paragraph:

"It gives me great pleasure to notify you that, at the meeting of the Directors of the Leominster Gas Light Company, held this day, it was resolved to reduce the rates for gas in the town of Leominster, the reduced rate to be $1.70 gross, per 1,000 cubic feet (formerly $1.80), with a discount for the first 2,000 cubic feet consumed, of 20 cents per 1,000, making the price $1.50 net per 1,000 (formerly $1.60), and from the gross price of $1.70, a discount of 45 cents per 1,000 for all gas consumed in excess of 2,000 cubic feet monthly, making for this a net rate of $1.25 (formerly $1.40). The new schedule to take effect on all gas consumed after October 1, 1910."

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Circular Letter over Membership Increase, American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF J. C. D CLARK,
PEOPLES GAS BUILDING, CHICAGO, ILLS.

The following explanatory matter, issued at the instance of Mr. J. C. D. Clark, Second Vice-President and Chairman of the Membership Committee of the American Gas Institute, is well worth due consideration and prompt action:

I have written the letter which follows to the members of the Gas Institute, and in sending it to you as an associate member, I do so knowing that it applies quite as directly to you as it does to a gas company.

A good many men representing our associate members as salesmen are so limited in their knowledge of the gas business that questions which are naturally asked, regarding the operation of the appliances which they represent, are met with superficial answers which sometimes disclose a total ignorance of the fundamental principles underlying the industry. No representative of an appliance for the use of gas is equipped properly to successfully exploit his product until he is practically familiar with the underlying principles of the gas industry. When properly equipped, he becomes immeasurably more efficient and more profitable to his employers.

Are your representatives so equipped? If not, the Institute offers you an opportunity to develop their knowledge practically without expense, and the following letter becomes of vital importance to you.

One of the underlying objects of the American Gas Institute is the education of the employees of gas companies to enable them to better perform their duties. Like some clause or article in the Constitution of a government, this clause in the Constitution of the Institute may now lie dormant in the mind of its membership, and I desire to bring its vitalizing and amazing importance home most cogently to you as a responsible officer of your company.

The question of prime importance is how to develop in our industry the talent which already exists. There is not a gas organization in this country which does not possess in its ranks young men of ability, who, if given opportunity and encouragement to develop a better knowledge of manufacture, distribution and sale of gas, would make good use of that opportunity, with enormous resultant benefit to the companies with which they are connected.

I ask you to take the above facts home to you. Look over your employees carefully, seek out those who give promise of being able to bear the burdens of the future which must so soon fall upon them, and begin their development at once. Establish an educational foundation among them for your future progress. Give these young men confidence in themselves and a feeling that they are a part of the motive power behind the advance of your industry. Give them a membership in the American Gas Institute, either active or junior, and secure for them the splendid bi-monthly digest of all literature covering not only the manufacture and distribution of gas, but giving all the new means of attracting business. See that they give the proceedings of the Institute the careful consideration which these proceedings deserve. See that they attend the meetings. Arouse in them the desire to become an integral factor in the upbuilding of your company.

Many gas companies perhaps overlook the fact that any member of the Institute may take a thorough correspondence course in gas engineering covering three years, under Alfred E. Forstall, and this great opportunity is given without additional cost. The value of such a course to every man in the employ of a gas company, who is capable of understanding it, must be apparent. It is not less apparent that, in the commercial departments the training of men to meet the difficulties of competition, remedy troubles and answer the public intelligently, is a matter of considerable importance. There are certainly a number of men in your employ who ought to make it part of their business to utilize these advantages.

There is no other investment a gas company can make which will be more profitable to it than arousing vital, intelligent and active interest in the progress of that industry in the minds of the young men it employs. The way to really view the Institute is as a means by which, at practically no expense, a gas company can lift its young men, from the mere clerical and mechanical round of duties, into a proper idea of themselves and their relation to the industry. There can be no question as to the profitable results of such an uplift. You owe it to your young men and you owe it to your company. You must build the foundation for the future upon the proper development of your young men.

Kindly send me by return mail a list of a number of the most active men in your employ whom you desire to have join the American Gas Institute, and upon their acceptance as members, give a little pat on the back, and tell them of the honor which has been conferred upon them by you and by the Institute, and say that it is up to them to make good.—J. C. D. CLARK.

[No. VI.—Concluded from page 146.]

Review of the Twenty-fifth Annual Report, Massachusetts Board of Gas and Electric Light Commissioners.

[Prepared for the JOURNAL, by MR. H. THURSTON OWENS.]

There were 15 companies making or selling more than 100 million cubic feet of gas a year, and their accounts, covering income and expenditure, have been analyzed as usual. Some indication of the results obtained may be had by taking the returns of three of these companies, which are given in Table I. The company showing the lowest cost of manufacture, purchase and distribution of gases, less residuals was, Lynn; the highest, Newton; the third company taken (Boston) being the largest.

TABLE I.—*Analysis of Accounts of Three Companies.*

	Lynn.	Boston.	Newton.
Income from manufacture of gas per 1,000 sold	$0.9095	$0.7629	$1.0584
Expenses of Manufacture.			
Coal, per 1,000 made.	0.17376	0.09383	0.45571
Enrichers " " "	0.06261	0.14406	....
Purifiers " " "	0.00361	0.02311	0.03667
Water " " "	0.00311	0.00458	0.01039
Wages " " "	0.04709	0.05431	0.14172
Repairs and maintenance " " "	0.04505	0.02219	0.28901
Renewals and maintenance " " "	0.00053	.....	.....
Apparatus and machinery " " "	0.00171	0.00706	....
Total cost of manufacture " " "	0.33747	0.34914	0.93350
Net cost in holder less residuals " " "	0.26054	0.33856	0.80942
Gas purchased, per 1,000 bought.	.....	0.25603	0.41450
Total net cost of gas made and purchased, per 1,000 sold.	0.27357	0.30964	0.45779
Expenses of Distribution.			
Wages, per 1,000 sold.	0.03547	0.03772	0.06206
Repairs of mains and services " " "	0.03208	0.01947	0.04799
Repairs of meters " " "	0.02434	0 01480	0.01117
Tools and appliances " " "	0.00204	0.00627	0.00136
Gas stoves " " "	0.01610	0.00546	0.03473
Public lamps " " "	.....	.....	0.04071
Total cost of distribution " " "	0.10973	0.08372	0.19802
Office and other Operating Expenses.			
Office expenses	0.02911	0.06034	0.11496
Taxes	0.04134	0.06482	0.03821
Miscellaneous	0.01231	0.00773	0.02461
Total cost of manufacture, purchase and distribution of gas less residuals	$ 46606	$.52625	$.83359
Dividends per cent.	30	9	8

The showing made at Lynn is remarkable, inasmuch as it is nearly 5 cents per 1,000 less than for 1908, and over 11 cents less than 1906. Among these companies Lynn has returned the lowest figures for the past 4 years, while the highest has been from a different plant for each of the years as follows:

1909	Lynn	$.46606	Newton	$.83359
1908	"	.51377	Brockton	.85444
1907	"	.53215	Salem	.87133
1906	"	.57757	Malden	1.0744

The reduction in the high figure represents a gain of 22 per cent. during the 4-year period, while that at Lynn was 19 per cent The figures given in Table I. show some curious conditions, as otherwise the high company would not be nearly double that of the low one.

The cost of coal and enrichers is practically the same at Lynn and Boston, while it is 22 cents per 1,000 higher at Newton. At the last named repairs and maintenance, wages and office expenses are the other figures which go to make up the increased cost.

In Boston over $500,000 worth of gas was purchased at a figure considerably below the cost of gas manufactured, so that the total net cost per 1,000 sold, including gas purchased, is less than the cost per 1,000 made, less residuals. Similar conditions exist at Newton.

Utilizing Waste Heat from Gas Engine Plants.

In a paper on this subject, prepared by Mr. John T. Faig, for the meeting, in Cincinnati last month, of the National Gas and Gasoline Trades Association, the author (who is Professor of Mechanical Engineering, Cincinnati University) remarked:

The designer of steam plants finds a wide variety of auxiliaries in the market. Open and closed feed water heaters, surface, jet and barometric condensers, steam heating and drying coils, cooling towers for water, and water softening plants of many types are available. From these he may select elements which will give the most desirable combination for the particular problem he has to solve.

In many cases the installation of such auxiliaries makes possible a higher net economy than can be obtained with internal combustion engines without auxiliaries, notwithstanding the higher thermal efficiency of the latter engines. This is particularly true of large office buildings, where the exhaust steam may be used for heating, and factories, where it may be used for heating or industrial purposes requiring low pressure steam or hot water.

Two sources of great heat waste occur in internal combustion engines, the jacket water and the exhaust. This waste is so common that there is danger of losing sight of its importance. The amount of heat so lost varies in different engines, but is nearly always three times as great as the amount converted into work in the cylinder.

Except for the Gueldner engine, which gave such remarkable economy as to be exceptional, the tests showed that about 25 per cent. of the heat of the fuel was represented by the indicated horse power. Practically all the remaining 75 per cent. was lost in the jacket water and exhaust. As these tests were made on engines in good condition, and were considered good enough to go on record, there can be no doubt that the losses of heat in the jacket water and exhaust for everyday engines will be considerably greater. Beside the losses already mentioned, there may be mentioned the mechanical friction of the engine and the radiation, which are inevitable and constitute together not more than 5 per cent. of the heat of the fuel. The mechanical friction is, of course, included in the indicated horse power.

Not only is the heat of the jacket water lost in most cases, but its removal entails considerable expense; that is, the cost of the jacket water itself. There are, it is true, some few installations where the jacket water is used for heating or industrial purposes, but these are merely exceptions to the general run of plants.

The development of auxiliaries that will utilize the heat of the jacket water and exhaust gases must keep pace with the development of internal combustion engines if these engines are to compete with steam engines where the exhaust is used. Where hot water for heating or industrial purposes is required the utilization of most of this waste heat presents no great difficulty. Fig. 1 represents an engine with

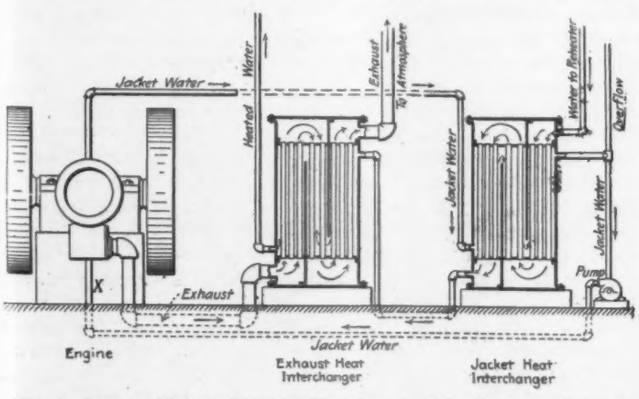


Fig. 1.—Proposed Method of Utilizing Waste Heat in Jacket Water and Exhaust from Gas Engines.

two simple heat interchangers, one using the jacket water and the other the exhaust gases. The jacket water is used over and over. The water to be heated must have sufficient pressure to overcome friction of passage through the interchangers.

The same idea may be expressed in many different designs. There is no reason why one interchanger should not be placed on top of the other, or the two combined in the same shell. One form of interchanger has recently been put upon the market.

Some firms use part of the heat of the exhaust for vaporization of water for the producer. The writer has given some attention to the utilization of waste heat from producer power plants and has designed a plant utilizing practically all of the heat in the coal, except the inevitable losses of hot ash, mechanical friction and radiation, all of which may be reduced to very small percentages of the total.

The interchanges may be of the simplest construction, since all pressures are small and temperatures comparatively low, the highest being that of the exhaust gases, from 600° to 1,000°. A thermostatic valve could be installed at (*X*) to automatically admit cold water from the city mains should the temperature at (*X*) rise too high. This might occur if for any reason the circulation of the water being heated should be stopped. The exhaust gas interchanger should form an excellent muffler. The exhaust pipe between the engine and interchanger should be covered to reduce heat loss to maintain a reasonable temperature near the engine and to prevent burnt hands.

Fig. 2 shows an interchanger using the jacket water of an internal

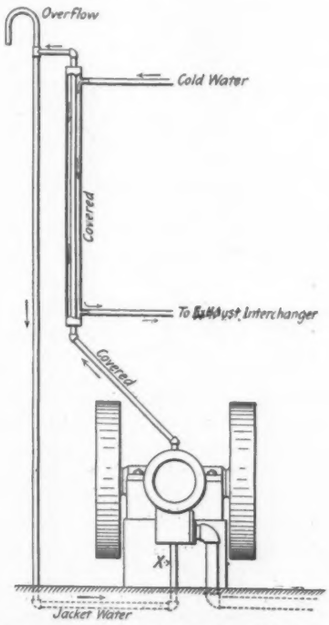


Fig. 2.—Alternative Method of Utilizing Waste Heat in Jacket Water from Gas Engines.

combustion engine to heat water. The jacket water is used over and over. The heated water passes to an exhaust interchanger, similar to that in Fig. 1, to be further heated. This arrangement does away with the necessity for a circulating pump in the jacket water line. A thermostat controls the admission of cold water to the jacket water line and will operate if for any reason the interchanger does not absorb sufficient heat from the jacket water. The jacket water interchanger may be secured against a wall overhead to save space if there is sufficient head room. The height which will give the proper circulation for a given engine could probably be determined only by trial.

Commission Control of Public Service Corporations.

[From the Address by Mr. F. P. Royce, Graduate School, Harvard University.]

I am to speak to-day upon matters connected with public service corporations, particularly those doing what may be termed a local business, one which is conducted in a single city or perhaps in a group of adjoining municipalities, as distinguished from those public service corporations whose field of operations is much more extended, usually over more than one State, such as the transportation, telephone and telegraph companies.

Of these "local" companies the most important are those manufacturing and distributing gas, electricity and water for all purposes, street railways and certain telephone companies. The interests of nearly all of the local telephone companies, however, are now so closely identified with the interests of the large corporations doing an interstate business that they are really a part of such properties.

The relations between the public utility companies mentioned and the communities they serve are of such a close character that the results of operation are of direct importance to both. In the first place, in order that these companies may do business at all it is necessary

that they should have franchises granting them the right to use the public streets. While it is proper that this should be done, as it makes it possible for the necessary plants to be constructed with the least possible outlay and consequently reduces the capital charge on which a fair return may be earned to a minimum, helping to make the rate for service as low as possible, it is true that the public having granted the franchises to the companies have an interest in the properties and are entitled to certain consideration which they would not otherwise have.

On account of the conditions surrounding these companies they must of necessity be in a sense monopolies; that is to say, they must be free from competition with companies doing the same business in the districts they serve, provided they furnish service of proper standard at substantially as low a price as any other company operating on legitimate lines could do. To understand this statement it must be seen that the character of the business done is entirely different from almost any other. These companies are all limited in the field of their operations to the exact location of their properties. A gas or electric company can only do business along the line of its permanent distributing system, and a street railway company has no earning power except on its roadbed. Any other manufacturing company producing some portable commodity may develop an unlimited field. If, for any reason, on account of local conditions, one such company has any advantage over another in one section, and the latter company cannot in consequence market its products there, it is free to go elsewhere to develop other fields, but the public utility company cannot do this. When any part of its distribution system is once completed it cannot be moved except at too great a sacrifice. If competition is permitted under these conditions, either one of two things must happen—the company will be unable to earn a fair return on its property or will be obliged to lower the standard of its service to a point where it will no longer be satisfactory to the public served. It is, therefore, essential to all interested that every community should be served by successful public service companies. Duplications of electrical distribution systems either above or below the streets or of gas distribution systems under the streets are distinctly uneconomical, and in nearly all cases where such duplications have been permitted the ultimate result has been that the two properties eventually became united, with a large waste in the plant really necessary to do the business and consequently a heavy increase in the capital charge.

While gas and electric companies are in competition along certain lines, it is very likely true that this competition may be of a healthy character; and it is also true that each kind of company has a field for business of its own, so that both may succeed while serving the same community.

Certain interesting cases bearing on the propriety of the right of an electric light or power company doing business in any community to be free from competition, have risen in places where such companies generating their current by steam power have operated for a time and later on good water powers have been developed within such distance that the current generated at the water power can be satisfactorily transmitted to the locality already served. If these water powers have been developed at a reasonable cost and actually have a sufficient and fairly uniform capacity of production, it would probably be true that they could furnish current to the community already served by the established company using steam as a motive power at a less cost than could the latter company. In cases of this sort it must be borne in mind that the existing company is only entitled to freedom from competition so long as the community is furnished with energy at substantially as low a price as it could be provided by any other company operating on legitimate lines, being in this instance at the price it could be furnished for by the water power company. The proper solution of such a situation is for the water power company to sell its product to the existing company, which in turn will distribute it to its customers. By doing this a duplicate distribution system would be avoided, and the original steam plant of the existing company could be used for relay purposes. By following such a course the existing company could maintain its fair profit and the consumers would have the benefit of a reduction in cost due to the fact that the energy purchased was generated by means of water power.

In view of the fact that to conduct their business the companies must have franchises granted by the public, and also that they should have an opportunity to do business free from injurious competition, the public served have the right to demand that the service furnished by the company should be of a high character, that the company should be willing to make extensions of their lines wherever they are reasonably required, and that the prices charged should be fair for the service rendered. The obligations, however, are by no means entirely on one side, and the company which meets these requirements of the public having invested money in good faith in the undertaking has the right to earn a fair return on the value of the property needed to conduct its business and to be free from competition from other companies doing business of the same character in the territory served.

Such companies should, so far as possible, be free from attack by persons who even though well meaning are ignorant and misinformed in regard to actual existing facts. This is important to the public as well as to the company. For example: If a company doing its business well and fairly is the subject of many unfair statements, it is probable that these statements will have their effect on the holders of the company's securities. It then becomes more difficult for the company to continue its necessary financing and it is obliged to pay more for the money it needs, which must be reflected in higher prices to the public served.

In the early days of these industries their business was of a distinctly hazardous character. There have been times when the future of each was by no means assured, when the earning capacity was a matter of doubt, and in those days it was essential that they should receive the most liberal treatment from the communities served or it would have been impossible to make satisfactory progress and to raise the capital necessary for their development. To-day these public utilities are in many cases on a sound basis. Mistakes have been made in many instances; some properties have not been designed with good judgment and are not adapted to the service required of them. Such companies still have a time of uncertainty before them when unusual courage and energy are needed on the part of the operators. In a majority of cases, particularly in the larger communities, the companies have been developed properly; their future is assured so far as can be seen, and it is probably true that the public should now receive more from such successful companies than it formerly did, and that such companies themselves are satisfied with somewhat less in the way of future profits than they formerly were. The statements above made as to the rights of both interests are gradually being accepted as sound by them, and there is a growing belief that proper methods should be provided to insure their maintenance.

The best plan that has as yet been devised for this purpose is to provide for the organization of State commissions which have the right to supervise the affairs of public utility companies and the power to adjust certain differences that may arise. It is essential that the duties and powers of these commissions should be limited to supervision, and that they should have the right on behalf of the public to see that the rates charged by the companies are fair, that extensions are made wherever they are reasonably required, and that the service is as good as should be furnished under existing conditions. They should also have the right to regulate the issue of securities by the companies and to see that these represent the fair value of the properties. On benalf of the companies, they should have the right to protect them against improper competition so long as they continue to do their duty toward the public served. This plan of supervision by commission has met with growing favor. Massachusetts was the first State to take this step. Twenty-five years ago the legislature passed the necessary laws to provide for the Board of Gas and Electric Light Commissioners, and to specify its duties, which have been added to from time to time. The commission now has the right to authorize or refuse the issue of bonds and of stock to be issued by the gas and electric companies. Bonds cannot be issued at less than par, and in the case of stock issues the commission has the right to determine the price, not less than par, at which they may be offered proportionately to stockholders. They also have the power, from time to time, to determine rates for gas and electricity, and can order extensions of lines when reasonably required to furnish service to new customers. Similar powers of supervision and adjustment of rates are exercised by the Board of Railroad Commissioners over the street railway companies and by the Highway Commission over the telephone companies. This plan of supervision by commission has now been followed in New York, Wisconsin, New Jersey and other States. With them it has been usual not to follow the Massachusetts plan of having service commissioners, but to have one public service commission having the powers mentioned over all public utility companies.

The powers and duties of these commissions are of vital importance and call for distinctly judicial ability in the members. The

determination of fair rates for service is one of the most difficult and important. It has now been firmly established by the decisions of the United States Supreme Court that any company is entitled to a fair return on the value of the property owned and necessary to conduct its business, but no general rule applicable to all companies has been determined to establish what a fair return is, and it has been made clear that it will continually vary under different conditions.

The history of these public utilities shows that in the early stages of their development their business was hazardous, and at such time those investing their money in various enterprises of this sort were entitled, on account of the risk they ran, not only to a fair income on the money invested, but also in case the enterprises succeeded, to a gain in their capital. As these public utilities were developed and the permanency of their business became more assured, capital was more readily attracted and could be procured on more reasonable terms. In many cases the companies were successful in making for their stockholders a fair rate of income and also were able to accumulate a surplus. This surplus has sometimes been the subject of criticism, for as it is now possible to get capital for successful companies on a reasonable basis the public forget that within a few years the condition was so different that at that time the money necessary to develop a business could not be procured without the prospect of a large profit, and that if it had not been so procured development would have been greatly retarded and the low cost of production today would have been impossible.

Perhaps the most important rate case recently decided was in 1909, when the United States Supreme Court ruled that an order passed by the New York Legislature, fixing the rate for gas in New York city at 80 cents per 1,000 cubic feet, was fair and reasonable. In this decision the court recognized the fact that the company was entitled to a fair rate of return on its entire property including its "goodwill," or, as erroneously called, its franchise value, and stated that in the court's opinion such a return should not be less that 6 per cent. per annum in that particular case. It is apparent that no company is more firmly established than the gas company in New York and none are subjected to less danger from possible future developments. Consequently this decision may be fairly taken to mean that public utility companies, when permanently and strongly established, are entitled to a return of 6 per cent. on the value of the property actually required to conduct the business, and it naturally follows that those companies having less stability and less certainty of permanent success are entitled to a higher rate of return.

It is important that the commissions who are called upon to pass on rates should establish approximately what may be called a standard of efficient operation, which, if followed, will entitle the company in question to the rates of return referred to; but, on the other hand, those companies having managements which have shown unusual ability, resulting in decreased cost of operation and unusually low rates to consumers, should be rewarded by an even higher rate of return on their property; otherwise there is not sufficient incentive to the best management. This principle has been recognized in the so-called sliding scale system under which many of the gas companies in England now operate, and which is also followed by the Consolidated Gas Company of Boston.

Companies should be allowed to charge rates which not only permit of fair returns on the investment but which will also be sufficient to provide for necessary depreciation of plant. This is essential, so that there may be at no time any impairment of assets.

The rate of depreciation in connection with the different kinds of public utilities varies materially and it is essential that the commission should have a full knowledge of the facts.

Another of the most important powers of these commissions is to determine the amount of securities to be issued by any company under their supervision. This involves many considerations and in some cases is a more difficult matter even than the determination of fair rates.

The ability of a public service company to procure at reasonable rates the capital required to properly develop its business is probably the most important factor to be considered in connection with these companies to-day. It is vital to every undertaking that money must be procured or the development cannot go on. In nearly all cases a study covering a term of years of the operations of these companies will show that the increase in the amount of capital necessary to extend their business as required has been at a greater rate than the increase of the annual gross earnings. That is to say, if a company has shown an annual increase in its business of say 10 per cent. it is usually true that the increase in the capital charge has been considerably greater. This has been due to several causes.

1. The standard of service required has been continually raised and more expensive plants are necessary to meet it than was formerly the case.

2. The prices for gas and electricity have been continually reduced and a much larger output from any plant is necessary to produce a given return than was formerly the case, from which it follows that the plant producing the output must have a greater capacity and a greater value for the same monetary return. Furthermore it will be seen that the yearly increase of the capital requirement must be figured on a compounded basis and is consequently of extremely rapid growth.

The ideal plan would be for the entire cost of any property to be represented by an equal amount of permanent securities taken at their par value, but in many cases such a plan would be impossible, as the necessary funds could not be procured on that basis. As has been said, those who invest in such companies when the business is undeveloped and the future precarious are entitled to a profit on the capital invested, and the only effective way to make such a profit possible is to sell securities at a fair and proper discount from their par value. These conditions are true to-day in connection with certain companies, notably those developing water power in remote sections, where the market for power must be largely developed, and certain lines of new street railways. In such case the plan of selling securities at a discount must still be followed or the money necessary cannot be procured and the important utility will remain undeveloped. Both in the determination of rates and the amount of new securities to be issued, it is usually necessary to ascertain the real valuation of the property of the company under consideration. In all such cases the following elements of valuation should be determined:

1. Structural valuation covering the physical property.
2. Amount of working capital necessary.
3. Intangible property.

In considering the structural valuation it is necessary to show the cost of reproducing the property new at the time of its examination, and in doing so the commission must add the cost of employing competent engineers, the interest on capital necessary to pay for the construction but having no earning power during the building period, and the cost of necessary organization. They should also take into consideration the fact that any plant must be built gradually, additions being made from time to time as demand arises, and that the costs of this intermittent or piece-meal construction is much greater than it would be if the entire plant were built continuously at one time.

In considering the value of real estate, any appreciation in land values should be credited to the plant. From the total value so determined must be deducted a fair amount to cover any depreciation that may actually have taken place in any part of the property.

Working capital is as essential as machinery. No company can be operated without coal, oil and supplies, and a reasonable amount of cash must always be on hand to meet any contingency and a fair amount provided for operations.

The principal intangible asset consists in the value of what is ordinarily known as a "going business." This may perhaps be best defined as the difference beeween the value of the plant as an accumulation of land, building, machinery and supplies and the same property with a developed market and an actual earning capacity.

In order to build up such a business it is always necessary to spend large sums in instructing the public, through advertising, soliciting, etc., in the value of the service to them.

Losses are incurred in making initial installations or extensions of plant which for long periods of time may remain unremunerative. The cost of experimental work is always heavy and structural losses are frequently incurred due to the necessity of changing apparatus to meet new conditions, which changes were in no wise due to the fault of the management. All of these expenses are real, must be borne by the compauies and represent actual and permanent value in the successful business development. It is frequently held by the public, but clearly in error, that all of this value of the "going business" is really represented by the franchise, and that as the franchise was granted to the company by the people without cost it is not proper to capitalize it. The fact is that the franchise was merely a permission to use the public highways and that while this mere right to use may in itself represent no part of the property on which the company is entitled to earn a fair return, it is nevertheless true that the business which the company has built up at a large ex-

pense after receiving permission to use the highways has a very real value and is an asset of the company on which it is entitled to a fair return.

Having determined the fair valuation of any property which may be represented by securities, the commissions have the power to approve the kind of securities which the management of the companies wish to issue. The companies should procure the necessary money on as low a basis as possible. To do this in connection with the development of any new project a bond issue is usually necessary. This must be for only such an amount that the annual fixed charge representing the interest and perhaps a sinking fund shall be considerably less than the assured net earnings. The balance of money required should be procured by the sale of common stock, or, if the project is a large one, by a moderate issue of preferred.

In the States where commissions have been organized, the public utility companies are nearly all on so sound a basis that money for extensions may be secured with little or no discount on the securities and they have not yet been obliged to pass on cases where a large discount on the new common stock issue will be necessary in order procure the capital needed.

[Communicated.]

Outside Show Window Lighting, and the Welsbach Multi-Flex Gas Arc Lamp.

Outside show window lighting has generally fallen into disfavor in this country, although it is still a much used method abroad. At present, however, there is undoubtedly a distinct move toward reinstating this really very effective method into favor. It is not quite clear why the method should ever have so far declined, for it combines several very apparent and decided advantages over purely inside lighting. First among these advantages is the fact that it attracts attention to the windows and to the store for a much greater distance by reason of the brilliant illumination on the sidewalk and the conspicuousness of the lamps themselves.

For some time after its introduction into this country, the flaming arc lamp found little other use than as a purely spectacular piece of illumination for use in front of theaters, hotels, and other business buildings, and from its very evident value as an attraction in such cases it was an easy inference that similar illumination was a good thing for a store front, so it came to be used for this purpose. The flaming arc, however, is totally unsuited to window lighting, for obvious reasons, whereas the gas arc is particularly suited to the purpose. The real value of a show window is measured by the number of people who look into it. No matter how beautiful the display may be, or how well lighted, unless it is seen by possible customers it is a dead letter. The flaming arc lamp attracts attention, because of its unusual color and brilliancy, and has been largely sold for that reason, though expensive in first cost and troublesome to maintain.

The advent of a perfect and reliable inverted gas arc placed this important field of illumination within easy reach of the gas companies, for arc lamps can be installed on a flat rate basis, including maintenance, and thus give the customer no trouble whatever in upkeep and no chance for dissatisfaction in regard to gas bills.

In point of results in illumination the inverted gas arc will successfully hold its own against any other competitor, electric or otherwise. The volume of light given is sufficiently large to give a very distinct impression of brilliancy, while the color is the nearest to daylight of any practical commercial light source, thus giving it a very distinct advantage over the ordinary flaming arc with its ruddy yellow light.

Another advantage in lighting windows from the outside is the better direction of the rays, which show the goods equally illuminated even though the windows are filled to the tops. Other advantages are absolute safety from fire, much greater economy, and less attention. For the small store window the outside inverted gas arc is undoubtedly the best of all methods.

The successful outside inverted gas arc must, therefore, be credited with placing within reach of gas companies large and profitable field for increasing the sales of gas. The illustration portrays the latest type of Welsbach multiple gas arc lamp used for store window lighting.

New Method for Testing Coal Tar Creosote.[1]

The July number of the "Journal of the Society of Chemical Industry" contains a paper by Mr. J. C. Mann, read before the Birmingham Section of the Society, in which the methods of testing coal tar creosote are dealt with. Mr. Mann says that the importance of creosote to the tar distiller may be gauged from the fact that, next to pitch, it is by far the largest of his crude products. The author estimates that the annual production in Great Britain from gas works tars alone is about 25,000,000 gallons. To this may be added the amount distilled from coke oven tars, which probably reaches another 10,000 gallons. He does not anticipate that the above figures will be increased in the near future, but probably reduced, owing to the amount of tar and tar preparations likely to be absorbed for road making.

Recent tests in the United States of the merits of different wood preservatives and methods of application have placed coal tar creosote in the first rank. The result of this has been to give a welcome demand for the article, the oil being shipped in bulk to the States, the individual cargoes reaching, in some instances, to nearly 1,500,000 gallons. A considerable quantity is also exported, in barrels, to Northern Europe, Russia, South America, South Africa and New Zealand. At one time Germany did import, but with the general adoption of coke oven recovery plants the Germans now not only supply their own requirements, but even export. However, it is interesting to know that "English" coal tar creosote holds its own. Our own railway companies consume a large quantity for treatment of sleepers, etc., and to this must be added that used for treating telegraph and telephone poles, for fuel oil, disinfectants and a variety of other purposes.

The specifications of buyers of creosote differ, but most of them have clauses defining (1) the maximum percentage of water allowed; (2) the minimum percentage of phenolic bodies to be present; (3) the temperature at which the oil shall remain liquid (or fail to deposit naphthaline) or the maximum amount of naphthaline to be present at a given temperature, generally 15.5° C.; (4) the specific gravity and the maximum amount of distillate to be given at some stated temperature.

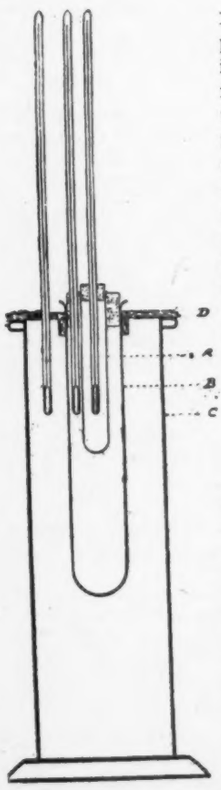
Having described the usual methods of determining these several factors, the author proceeds:

For some years past I have worked on and used a method for the approximate determination of the amount of naphthaline present at 15.5° C. which appears to give very satisfactory results. The method is based upon the determination of the rise in temperature, due to the latent heat of crystallization of bodies contained in the distillate. At first, I thought it possible to make the determination on a small part

1. *Gas World.*

of the distillate obtained in clause 4, that is to say the distillate yielded at 315° C., using an aliquot part of the remainder for the determination of phenols, and thereby save a distlllation, but although the method worked fairly well when dealing with light creosotes (which practically distilled all over below 315° C.) it was not applicable to creosotes containing a large percentage of heavy oils, the results being much higher than the actual. For the purpose of this determination it was found necessary to carry the distillation further.

The apparatus used for determining the latent heat point is shown n the figure.



It consists of an inner tube *A* (10 cm. by 1.5 cm.) provided with a cork through which passes a thermometer, preferably calibrated in 0.2° C., the zero mark being about 5 cm. from the bulb. Tube *A*, is fitted concentrically into tube *B* (18.5 cm. by 3.5 cm.) by means of a perforated cork. This cork also carries a thermometer. The space between *A* and *B* acts as an air jacket. Tube *B* is fitted into vessel *C*, which may be of any convenient size, the latter acting as a water jacket. *B* is carried by passing through a disk of wood *D*. A strong elastic band is slipped over *B*, after passing through *D*, to prevent *D* rising when immersed in water contained in *C*. Disk *D* requires to be clamped to rim of *C*, and also carries a thermometer. *C* is provided with a stirrer.

The test is made as follows:

A portion of the sample, about 50 c.c., is distilled from a small retort practically to dryness, or until incipient decomposition of residue is observed. The collected distillate is warmed until wholly fluid and then well mixed. The small tube *A* is removed from the apparatus and filled about two-thirds with the distillate and gradually cooled, being gently stirred meanwhile with thermometer, until the formation of crystals causes the contents of tube to become opaque, the temperature being noted. The temperature of the water jacket *C*, and air bath *B*, is then regulated so as to be 2° or 3 lower than the opacity point just noted. The contents of *A* are remelted and again cooled gradually to opacity. Any moisture is rapidly removed from outside of *A*, and the tube passed through perforated cock into *B*, the thermometer in *A* being adjusted so as to be quite central and about 2 cm. from bottom of tube. The temperature will be noticed to slowly rise, afterwards remain constant for from ½ to 1 minute, finally falling. The maximum temperature obtained is taken as the latent heat point.

The author has checked the results carefully and obtained very concordant results, and he thinks that coal tar creosote may be valued by it, so far as naphthaline is concerned, on its "latent heat point," in the same way as crude carbolic acid is valued on its "crystallizing point."

The Lighting of Postal Cars.[1]

[A paper read by Mr. F. M. Harned, Winnetka, Ills., at the Kansas City Convention of the Railway Mail Association.]

Mr. President, Gentlemen of the Convention: The history of the railway mail service shows a steady and constant improvement in lighting systems. The pioneers in our service were, perforce, content with candles. The first full R. P. O. cars were supplied with oil lamps of crude and unsatisfactory design. Constant improvement was, however, made. Some roads imported a type of German student lamp, which was the best that had appeared up to the early 70's. Experiments were made with a large lamp which had no chimney. It, however, was very unsatisfactory. As a result of study and labor a type of lamp was evolved which, as oil lamps go, has been considered the best obtainable, and has been in use, especially in apartment cars, for a number of years. In the words of the Honorable General Superintendent of our service, "Many an old clerk in the service to-day was forced to wear glasses much sooner than he otherwise would, owing to the trouble experienced with lamps in the mail cars in the early days."

Coming down to the present, we find four systems of lighting in use: Oil lamps, compressed oil gas, acetylene and electricity.

Of oil lamps it may be said that they are probably the most reliable of all forms of illumination, and for that reason it is believed every postal car should be equipped with, say, 4 two-lamp chandeliers to be used as auxiliary in case of failure of the main lighting system.

The objections to oil lamps are many. The light, at best, is red and unsatisfactory. After burning several hours their luminosity is reduced by a large percentage, some authorities placing it as high as 50. Unless kept in perfect condition oil lamps will smoke and burn unevenly. To everyone of us the experience of falling soot and dripping oil is not unknown. In cases of wrecks burning oil is a dangerous feature that must be considered.

Quoting from a technical paper on car lighting recently read before the American Society of Mechanical Engineers: "Oil lamps are, and probably will be, continued in use on a considerable percentage of passenger cars in America, but the illumination is inadequate, and after a few hours' use they show a radiation of but about 50 per cent. of the original amount of light without any decrease in the oil consumption. Moreover, the smell of the oil, the smoked chimneys, expensive repairs and high cost of maintenance make the use of oil lamps undesirable, where other and more modern methods of lighting can be used."

The compressed oil gas system which is most familiar to all clerks, will next be considered. The ordinary gas used for domestic purposes, called coal gas, is not available for use in cars for the reason that the compression necessary to store sufficient gas in the limited tank capacity that can be provided causes the gas to lose such a large percentage of its illumination power that it is practically useless for lighting purposes. The gas used for car lighting is generated from crude oil and under high pressure loses but a very small fraction of its original power as an illuminant.

The manner of using this gas in the old flat flame, 4-tip cluster is familiar to us all. The light so furnished is a decided improvement over the oil lighting system and is reasonably reliable. It is open to objections on account of the quality of the light; that is, the excessive amount of red, and the absence of green and violet rays in the spectrum, making it much more trying on the eyes than sunlight, the ideal which all lighting engineers are endeavoring to attain.

The most modern gas light is the inverted single mantle system. This has superseded the 4-mantle cluster, which was abandoned after some years' trial as unsatisfactory. My investigation has shown such a marked improvement in mantle construction within the past few years that the mantle now used in the single inverted mantle system is of sufficient strength and durability to be practical for car purposes. I have good authority for the statement that hard bumps when switching have no appreciable effect on them. The light is white and steady and the opalescent reflectors provide such a diffusion of the rays that there is approximately but 2-candle power per square inch of radiating surface. This causes a soft light, an absence of sharply defined shadows that is desirable.

The question as to the loss of the light-giving quality of the mantle through age is a subject of dispute. I have given considerable time to a study of this point, and was finally able to secure a statement from a man who stands very high in his profession as a lighting engineer and who is connected with one of the greatest lighting concerns on this continent. His statement is this: "In gas mantles, as elsewhere, quality counts. There are good mantles, and there are cheap, poor ones. The latter disintegrate and deteriorate rapidly; the best ones, very slowly and very little. Exhaustive tests by certain railroads have shown the average life of a mantle as a satisfactory illuminant to be 110 days."

Probably a goodly number of you gentlemen will be disappointed when I do not give electric lighting my unqualified indorsement, and I am expecting criticism on that score.

The three systems of electric lighting are head-end dynamo, straight storage and axle generator light. The first named is open to serious objection in that it is not flexible. The whole train is dependent for light upon one car. If that car is disabled and set out of the train the remaining cars are in darkness. Railroads as a rule will not consider the straight storage system, both on accouut of the excessive cost and the length of time necessary to charge the batteries.

Altogether the axle generator light is the most satisfactory of all the electric systems. Each car is independently lighted, and the

1. Reprinted through the courtesy of Mr. G. A. Wood, Editor "Railway Post Office."

batteries used in connection are automatically charged by the surplus energy generated when the train is at full speed.

The light given is in itself unsatisfactory, the red rays predominating to such an extent as to make it far from an ideal system of illumination. Tungsten lamps have been tried, but I am told can be used satisfactorily only at low voltage, which the axle generator light alone supplies. This statement is not made unqualifiedly, but all the information I have at hand is to that effect.

The light failures with the electric system are many more than with the others. In fact they are so frequent that many roads which have installed the electric lighting system are discarding it and returning to gas illumination.

A serious objection to electric lighting from the standpoint of the railway postal clerk is the variation in the light intensity. This is caused by a variation in the voltage brought about by the jar from passing over rail joints, switch points and crossings. Electric lighting machinery is delicately adjusted and thus far it has been found practically impossible to eliminate this variation in light intensity. This, as I have said, is a very serious objection, as it causes an eye strain that is telling in its effects.

Railroad and lighting authorities admit that for berth lights in sleepers and as ornamental lights in dining cars, electric globes have no equal. An idea of the prevailing opinion may be obtained from the statement made by Mr. Vaughn, head of the Mechanical Department of the Canadian Pacific Railway, at the February, 1910, meeting of the Canadian Railway Club held at Montreal. He said: "My feeling really is * * * that * * * gas (*i. e.*, compressed oil gas) is the most satisfactory for railway cars. We are using electric lights, although more for decorative * * * purposes."

Coming now to the acetylene system, I desire to tread carefully. When, in 1892, Thomas L. Wilson discovered that acetylene could be cheaply produced by the action of water on calcium carbide, the discovery was hailed as one that would revolutionize the lighting systems of the world. It was soon expensively proven that free acetylene was a highly dangerous explosive. As a result, the Canadian government, and several State governments in this country, passed drastic legislation prohibiting the storing of acetylene. There are at present two systems in use of furnishing acetylene light to railway cars. In one the gas is generated as used, not stored. Each car is equipped with its own generator. I have been unable to secure the desired information on this system, but have been told that it is not satisfactory on account of being unsteady. I am not ready to vouch for the truth of this statement, but will say it has come to me from various sources in which I have confidence.

The system that is coming into more common use is a storage system. Whatever else can be said of it, it must be admitted to be ingenious. The tank is the most interesting part of the system. Unlike all other pressure gas tanks, it does not contain free gas. The tank is packed with asbestos disks of 80 per cent. porosity. A cylinder, when so constructed, is first vacuumed and acetone is then permitted to flow into it until 40 per cent. of the empty volume of the tank is filled with liquid acetone. This is a sort of wood alcohol which has an affinity for acetylene and absorbs 25 times its own volume per atmosphere of pressure.

The light produced is white, steady and of high candle power. The claim is made that the spectrum analysis shows the light to be the nearest approach to sunlight that has yet been attained with artificial illumination. I have a statement from a clerk in the First Division, who has worked under this light, to the effect that it is the best all around illuminant under which he has worked, and he has had experience with all systems.

We are interested in the quality and reliability of the light used and also the element of safety. On this point I have made inquiry from every source available.

The Chicago convention of 1906 passed resolutions in favor of the installation of electric lights in all railway post offices. While the committee introducing the resolutions had, as the chairman stated, "carried on a very extensive correspondence in getting data as to the percentage of cars * * * lighted by gas, by electricity and by oil," the fact that the resolutions were adopted without debate tends to show that, as a whole, the convention was ill informed.

The company which controls the system of compressed oil gas lighting has given me the following statement over the signature of their manager:

"We have naturally investigated and followed up wrecks very closely to ascertain whether grounds existed for the charge which is often made that fires have been due to gas, and have almost invariably found that there was no foundation for the assumption that gas had been responsible. Almost without exception, a thorough investigation has proven that cars of wooden construction have splintered and have taken fire, either from coals from the locomotive or from stoves inside of the car. Of course, it is a fact that frequently the pipe connections are broken and the gas may become ignited, but it is so free from vapor and its diffusion so rapid that it is quickly dissipated and an explosive mixture or combustible condition is not readily obtainable. The records of the Interstate Commerce Commission for the past 10 years demonstrated that the number of cars burned in wrecks, in comparison with the total number of cars operated, is a very small percentage indeed. Damage and casualties in wrecks other than fires enormously exceed the fire damage, and the cause of the greatest number of casualties to postal cars and to their contents and occupants is the car construction."

In the paper previously mentioned as having been read recently before the American Society of Mechanical Engineers, the following statements are made:

"The behavior of oil gas in wrecks has been commendable. The gas itself requires a high temperature for ignition, and the flame temperature is comparatively low. Moreover, it is extremely difficult to light the gas when escaping under pressure, the tendency being to extinguish a torch or light brought near it. Further, the quantity of oil gas carried on a car is so limited and the gas is so free from vapor and its diffusion so rapid, that in the case of the rupture of a tank or the pipe connections, it is so quickly dissipated that an explosive mixture or a combustible condition is not readily obtainable.

"The alleged danger sometimes charged to the use of oil gas lighting for railroad cars does not exist. There are four times as many cars equipped with the oil gas lighting system as the entire passenger rolling stock of the United States of America and it has been in use on railroad cars upward of 40 years, and certainly the managers of railroads would not employ to such an extent a system of lighting which involved a serious hazard."

At a regular meeting of the Central Railway Club, held at Buffalo, N. Y., March 11, 1910, Mr. Brazier, Superintendent of Car Department of the New York Central Lines, said: "I have been in the railroad service for a great many years with systems that have used oil gas, and I don't know of a case where we have ever had an accident where the gas has burned the cars up. We have had a few cases where electric wires have been the cause of our cars catching fire, so we will not be entirely free from danger when we have everything equipped with electricity."

As to the safety of the acetylene storage system, in which the gas is carried in tanks filled with asbestos disks and acetone, I have the following statement from the sales' manager of the company which installs the systems and furnishes the gas: "There has been a good deal of agitation at certain times, and I believe bills have appeared in Congress calling for the elimination of all gas systems from postal cars, and the installation of electricity only. The danger from explosion is absolutely eliminated with our tanks. It is an impossibility to propagate a flame through a solid mass. A number of cars equipped with our system have been in wrecks, and the gas has simply burned off at the stud valve, as it is impossible for the flame to go through the packing. I feel, therefore, that we have eliminated one of the objections to lighting postal cars by gas." I have been unable to get any statement to verify the claim made. Railroad people generally are inclined to look somewhat askance at all systems of acetylene lighting on account of the high explosive force of the free gas. It is in use on some roads, but most of them are waiting to be convinced that it is not only a cheap, good light, but also that it is reasonably safe.

I want to say emphatically that the railroad managers are just as anxious as we can be to have a safe system of lighting. Their interest therein is identical with our own. Fires and explosions in wrecks are horrible things and we may be perfectly sure that no railroad official will sanction the installation of any appliance for lighting, or for any other purpose, that is not considered as safe as human ingenuity can devise.

In conclusion, I desire to make some general criticisms on lighting conditions rather than on any system. These are little things from the standpoint of expense to the railroad companies, but are big things to postal clerks, in that improvement along the lines suggested will help greatly to secure good and dependable light at all times.

In gas lighting systems all pipes should be blown out under pres-

sure at stated frequent intervals. I have seen cases where, because of some obstruction in the pipes, it was impossible to get a flame more than one-third standard size.

Many cars have insufficient tank capacity. Cars rated to carry gas sufficient for 21 hours should not be sent out on runs, where, in winter, lights will be used 28 to 30 hours before reaching a charging plant. If three tanks are insufficient, four should be installed.

As before stated, each 50 or 60 foot car should be equipped with four 2-lamp chandeliers for oil lamps to be used as auxiliary. These lamps should be burned at least a ½ hour every 2 or 3 days to see that they are kept in condition. These oil lamps are ofttimes not used by clerks for a period of 6 months or a year; and, unless burned frequently and kept in condition, when occasion arises that their use is necessary they are usually found in such condition that they are practically useless.

Proper care is seldom given the main lighting system. On some roads, practically no inspection is made, such as locating defective tips and replacing them with new ones, etc. I have seen cars run 10 days to 2 weeks with essential parts of the lamps entirely missing.

Our cars are painted white inside. How often have we seen cars inside of 6 weeks or 2 months after coming from the shop with the upper deck as black as coal tar? Furthermore, they ofttimes remain in that condition for the next 12 or 14 months, or until the car is again shopped. Now that reduces the light to such an extent that this negligence on the part of the railroad people is absolutely inexcusable. To insure a good light, car interiors should be thoroughly cleaned, top and sides, at intervals not greater than 2 months.

As a matter of economy for the railroad, some handier system of shutting off the light should be provided. Along about 4 A.M., when possibly some of the lights could be shut off, you can't find the gas stick and sometimes you feel too old and weary to climb up on the rack to turn off the light to save a few pennies for what some are pleased to call a "soulless corporation."

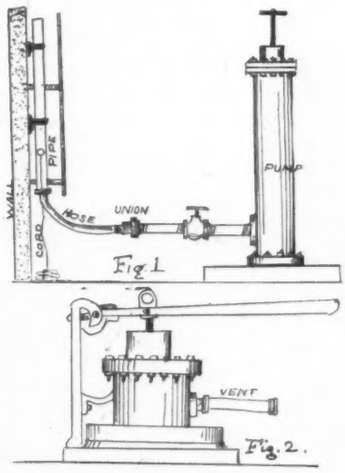
We have a right to ask for a more scientific installation of the lighting system. The center lights are all right for the distributing tables in the middle of the car and their location probably could not be improved upon. In the latter end, however, many of our cars are sadly deficient, as there the center light is all wrong. I have here some photographs showing the interior of one of the new steel cars recently placed in service on the Missouri Pacific Railway. These represent the most up to-date method of mantle lighting for postal cars and is the one which that railroad has adopted as standard. There are 5 center mantle lamps which I think are too few, and on the lower deck in front of the letter cases there are three special pendant lamps, as shown, and on the steel bulkhead in the end of the cars, two bracket lamps. These lamps are so located that when the clerks are distributing, the light is where they want it, and they are not standing in front of the light, causing a shadow. It has been found, in the operation of these cars, that after the mail has been distributed the clerks shut off the lamps on the lower deck and bulkhead, and the Missouri Pacific officials state that these are the most economically lighted cars they have in service. This system of installation appears equally applicable to oil gas, acetylene or electricity.

Stringing Wires Through Curved Pipes.

By "R."

The electrician frequently must get a line of electric lighting wire through a series of crooked conduits in a building, and often the conditions are such that the pipes employed for conducting the gases or other services of the building are utilized for conveying electrical wiring. It saves a great amount of labor and overhauling, as well as expense, if the electrician is able to get all, or part, of the wiring in position inside the pipes ready in place in the building. Hence problems are often coming which tax the ingenuity of the workman in getting the line through difficult piping. As there may be a number of turns in the pipe, and these must be passed, the project is to get a tape through in such a way that you can haul the wire along without getting it caught. I have seen instances in which whole sections of ceilings or partitions have been ripped out, to get a clogged wire through some crooked conduit. Several very effective methods are used in accomplishing the end desired, some of which are mentioned in connection with the illustrations. In one case the workman employed a common air pump—one of these foot pressure air or suction pumps can be bought at dealers in automobiles, as the pumps are the kind used for filling tires. The pump is placed near the conduit, as in Fig. 1, and the connection effected by means of a common line of hose of convenient length. The end of the hose line must be expanded sufficiently to slip over the end of the tube or conduit, and the cord, with wooden or rubber ball at the terminus, is introduced into the pipe. In order that the cord may pay out, a hole may be made in the side of the pipe. The cord passes through this hole; hence, when the pressure is exerted with the force pump the air is blown with ample pressure against the ball in the pipe to lift and push the ball along by the various crooks. The ball carries the cord along, then, with the cord extracted from the top somewhere, the wire can be pulled in.

Occasionally a force pump, of the kind shown in Fig. 2, is used.



Again, we find that some men resort to the blowpipe process of getting the cord in the conduit, as shown in the sketch.

Some Troubles with the Coal.

By "ENGINEER."

In the boiler plant of a certain gas works the flue did not draw—the boiler was of the water-tube pattern—and the engineer could get hardly enough power to run the necessary machinery of the plant. The coal hauling apparatus was handicapped due to lack of power, and various machines in different departments lagged greatly owing to the shortage of power and transmission. The large Corliss engine was all right, so the fireman and chief engineer decided that the coal was not up to the standard required for generating the proper pressure of steam. Getting to work on that problem, but still failing in getting up the registered steam, another investigation led to the thought that something must be wrong with the draft. Although the big brick stack appeared to be in correct working condition, nevertheless there was something wrong with the draft. We had raked and poked at the coal for hours without developing the proper draft to make the fuel burn properly, until finally we opened the slice bar of the stack, there to discover a lot of asbestos boiler surfacing, rolled and jumbled into a bundle, for the purpose of plugging or partly plugging the air channels, as illustrated at *A*, Fig. 1. Evidently someone in the plant had a grudge or a grouch—you will find such actuated men in many establishments. In this case an investigation brought out the fact that the coal supply had been changed from one company to another, and that the representative who worked in the gas works attempted to discredit the new supply of coal, by choking the air flues, in hopes that the company would blame the bad service to the new coal and return to the old, the latter being furnished by the company the workman represented, although he was hired by the gas works.

It was later found that the party in question had received a commission on the sales of coal from his company to the gas works. Another instance in mind of coal troubles in a gas works where a change in coal was made is this: Agents of coal companies are always striving to get your business, as is well known to managers of gas works, and there are men who offer all kinds of inducements for you to change your long fixed custom of buying coal from so-and-so for the purpose of placing an order with the company represented by the agent. In one case the manager of a gas works was induced to place an order for a dozen carloads of coal from a new concern. The coal appeared to be up to the standard so far as general characteristics were concerned, and the weight was right. The

price was a little lower as compared to the values of market coals, and the manager thought he was getting a bargain lot of coal until the workmen began complaining about the coal choking the stokers. A number of mechanical stokers were in use in the plant, and while the former grade of coal passed through the mechanical portions of the stokers, the new coal clogged and bound up on the feed rolls of the stokers, as at *B*, Fig. 2. A swollen bunch of clinkers resulted at each firebox. Half-burned coal could be detected everywhere about the furnaces. The drafts and the fires were nearly strangled. Now all this was remedied in a few days by making the feed channels wider and the feed rolls with more intervals. In some types of stokers you cannot regulate the feed rolls to accomplish this end; but in these particular stokers the feed rolls were adjustable. A little calculating and resetting of parts made everything work correctly.

Another instance which comes to mind concerning the coal supply in gas works brought the question of heat units into the game. The engineer of the plant had been accustomed to get coal of a certain fuel supply company, at the rate of $2.15 per ton, in carload lots, with a registered heat unit content of 15,000 to the pound. In a certain lot of coal which the engineer got hold of, and which was a few cents cheaper per ton, and with the equal unit register, quite a lot of trouble was created at two of the boilers. The fuel lacked the percentage of heating units supposed to be in the fuel, and in order to get the steam up an excess of heat was generated. The excessive heat under the boilers put the plates to a severe test, resulting in the bulging of some of them directly over the fire as at *C*, *C*, Fig. 3. Of course, the boiler

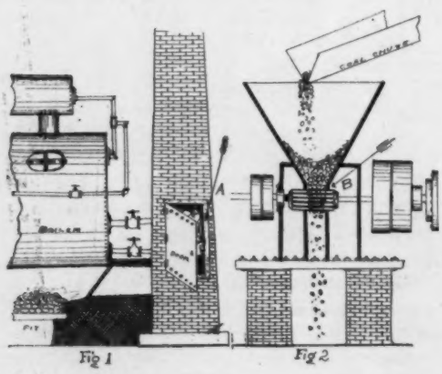


Fig 1

Fig 2

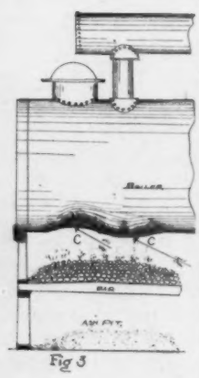


Fig 3

plate ought not to have been in condition to permit such swelling. The direct cause of the trouble was due to the gathering of foreign substances inside the boiler on the plates, thereby preventing the water from contacting with them. Lacking the cooling influence of the contacting water, the terrible heat from below got a full blast at the metal, causing it to swell. The introduction of the cheaper coal brought out the weak point in the boiler plate. The entire lower part of this boiler had to be cut out and several new plates riveted in.

Investigations with Respect to Carbonizing in Horizontal Retorts.

[Presented by Mr. J. Ferguson Bell, M.Inst.C.E., of Derby, to the June Meeting, Institution of Gas Engineers.]

The importance of working horizontal retorts to obtain the best results, both in respect to the gaseous, liquid and solid products obtainable from the coal carbonized, and so as to achieve comparative results, led the author to carry out a week's trial under ordinary working conditions with Derbyshire gas coal of average quality—the fine slack only being removed. Arrangements had previously been made with the colliery for exactly similar coal (Derbyshire Blackshale, an analysis of same being given in Table I.) to be supplied during these trials at the Litchurch Gas Works, Derby. In No. 1 retort-house, the period of carbonization was 12 hours' duration, and in No. 2 retort-house 8 hours.

In both houses the tests were carried on simultaneously (March 17 to 24, 1910), and the conditions as far as possible were similar in respect to the method of charging and the heat of the retorts; the only difference being the weight of charge and the period of carbonization.

The gas made (corrected to 30 inches bar., 60° F.), illuminating power ascertained by the No. 2 Metropolitan test-burner, impurities and calorific value were taken every two hours during the trials; and, in addition, average samples of purified gas were taken for analysis at the rate of ½ cubic foot per hour into a 10 cubic feet capacity test holder—a sample of the mixed gas being drawn therefrom into gas sample tubes to ascertain its composition. The temperatures of the retorts just before charging and in the combustion chambers of the settings were taken periodically by a Féry spiral pyrometer.

Table I.—*Composition of Derbyshire Blackshale Coal Used During Week's Trial.* Sp. gr., 1.374.

	Per Cent. Wt.
Carbon	72.22
Hydrogen	4.75
Nitrogen	1.35
Sulphur (volatile)	2.31
Ash	7.51
Moisture	4.49
Oxygen by difference	7.36
	Per Cent.
Total sulphur in coal	2.43
Volatile matter	33.98

Analysis of Coke Produced.

		Sp. Gr.	Carbon.	Volatile Matter.	Total Sulphur.	Ash.	Moisture.
No. 1 retort house.	12 hr. charges	1.59	84.82	1.838	2.78	10.34	0.664
No. 2 retort house.	8 " "	1.63	84.05	1.021	2.415	10.11	0.629

In No. 1 retort-house the settings are 8's, 3 tiers, D section, 22 inches by 16 inches by 18 feet through, heated by Klönne regenerator furnaces with light hydraulic seals on the dip-pipes; and in No. 2 house the retorts are of similar size and section, set in 4 tiers, Klönne regenerators, with anti-dip pipes. Carpenter's retort house governors control the suction on the hydraulic mains in both the houses. Care was taken to insure zero pressure as near as possible on the inside of the retorts during the trial.

The gases from Nos. 1 and 2 retort houses were kept separate, and purified by oxide only—being previously passed through Livesey tower and rotary washers.

Table II.—*Summary of Results Obtained from a Seven Days' Trial (March 17 to 24, 1910) of Derbyshire (Blackshale Seam) Gas Coal, Fine Slack only Removed, Carbonized by Charges of Eight and Twelve Hours' Duration.*

	No. 1 House 12 Hour Charges.	No. 2 House 8 Hour Charges.
	Cub. Ft.	Cub. Ft.
Total quantity of gas made (corrected 30 inch bar, and 60 F.)	3,585,100	8,881,900
Total quantity of coal used	296 tons 10 cwt.	751 tons 8 cwt.
Average weight of coal per charge	12 cwt.	8.21 cwt.
" duration of charge	12 hours.	8 hours
Gas made per ton of coal (30-inch bar. and 60° F.)	12,091 cub. ft.	11,820 cub. ft.
Illuminating power (No. 2 Metropolitan burner)	15.56 c. p.	16.29 c. p.
Sperm value per ton of coal	645 lbs.	660 lbs.
Cal. value of gas per cub. ft. gross	608.2 B.T.U.	586.8 B.T.U.
Do nett.	554.6 "	530.4 "
CO_2 in crude gas per 100 cub. ft	2.5 per cent.	2.4 per cent.
SH_2 Do.	1,040 grains	933 grains
CS_2 Do.	65.9 "	57.3 "
Total coke sold—large screened	139 tons 7 cwt.	334 tons 11 cwt.
Do. small "	36 tons 13 cwt.	111 tons 4 cwt.
Do. breeze.	11 tons 13 cwt.	27 tons 16 cwt.
* Coke made for sale per ton of coal, large screened	9.40 cwt.	8.90 cwt.
* Coke made for sale per ton of coal, small screened	2.47 cwt.	2.96 cwt.
* Coke made for sale per ton of coal, breeze	0.78 cwt.	0.74 cwt.
Coke used on furnaces per ton of coal	1.60 cwt.	1.65 cwt.
Do. 100 lbs. of coal	8.00 lbs.	8.25 lbs.
Total quantity of tar made	3,579 gallons	7,840 gallons
Tar made per ton of coal	12.07 "	10.43 "
Average sp. gr. of tar (water 1.000)	1.156	1.189
Total quantity of ammoniacal liquor made 5° Tw	10,536 gallons	25,459 gallons
Ammoniacal liquor made per ton of coal 5° Tw	35.53 "	33.88 "
NH_3 in lbs. of sulphate of ammonia	29.89 lbs.	28.50 lbs.

* The coke and breeze contained an average of 6.56 per cent. of water, the bulk of which was in the small coke and breeze.

The comparative results given in Table II. conclusively indicate, so far as the residual products - coke, tar and ammonia—are concerned, that there is a decided improvement in their production, which confirms the results given by the author in the paper read before the Institution in June, 1909.

The coke is somew hat harder and the proportion of large screened is greater. The color is improved, being silvery grey. The fracture in the filled retorts is radially from the center outwards—something similar to that from coke ovens. Coke analyses of 8 and 12-hour charges are given in Table I.

To accurately ascertain the exact quantity of coke made, certain charges were pushed out into a rectangular iron vessel with an air-tight lid. The hot coke was cooled by spraying water on the outside of the vessel. It was found that this method of cooling the coke effected a decided improvement in its appearance, and there was less breeze made than when it was quenched in the ordinary manner. There is a decided increase in the quantity of tar, which is thinner. Later, the author will probably supplement the figures with distillation tests of the tars produced.

The production of ammonia shows a decided increase—the production being, for 12-hour charges, nearly 20 pounds of sulphate per ton of coal carbonized. The nitrogen in the coal used averaged 1.355 per cent. by the Kjeldahl-Gunning method of estimation, so if the whole of the nitrogen could be converted into ammonia (NH_3) the theoretical yield of ammonium sulphate ($(NH_4)_2SO_4$ would be 143 pounds per ton of coal carbonized. This is, of course, impossible, as 35 to 40 per cent. or more of total nitrogen in the coal remains behind in the coke, and also part of the free nitrogen in the gas comes from dissociation of the ammonia.

The sperm value is higher than the figures given in the author's paper on this subject last year. It will be noticed that they are almost the same for both the 8 and 12-hour tests.

Although the sperm value is slightly lower for the longer charges, yet the calorific value is higher, indicating that the illuminating power and calorific value do not bear a strict relation to each other.

The sulphuretted hydrogen and carbon bisulphide are both somewhat higher in these tests for the heavier and longer charges, which is contrary to that experienced in other similar tests. The carbonic acid, on the other hand, is practically the same in each, being 2.4 and 2.5 per cent. by volume respectively.

TABLE III.—*Analyses of Gases—Samples Taken at the Rate of ½ Cubic Foot per Hour into a 10-Cubic Foot Test Holder.*

Composition of Gas.	No. 1. Retort House. 12-Hour Charges.	No. 2. Retort House. 8-Hour Charges.
Carbon dioxide	2.20	2.60
Illuminants	3.80	3.30
Oxygen	0.30	0.30
Carbon monoxide	5.60	5.20
Methane	32.90	34.00
Hydrogen	48.60	43.50
Nitrogen (by difference)	6.60	11.10
	100.00	100.00
Calculated calorific value from composition of gases	B.T.U. 567.6	B.T.U. 550.2
Average of tests by Junkers calorimeter made during collection of samples	556.0	515.2

In Table III. is given the average composition of the gases obtained. The author was somewhat surprised to find the percentage of nitrogen so much in each, especially as the carbonic acid is quite normal. The nitrogen being obtained by difference may account to some extent for the higher figure.

It is of interest to note that the net calorific value of the gases ascertained by calculation from its composition and that obtained by Junkers calorimeter are - especially in the heavier 12-hour charges—almost in agreement.

The mean average temperatures of the retorts in both houses taken (just before charging) by a Féry spiral pyrometer, it will be seen are almost identical, being in No. 1 house 995° C., and in No. 2 house 986° C., which is moderately high.

TABLE IV.—*Temperatures of Retorts and Combustion Chambers Obtained by Féry Spiral Pyrometer. Average Retort Temperatures in No. 1 Retort House—12-Hour Charges.*

Retorts.		Degs. C.	No. of Readings Taken.
A, B, C	Top row	970 960 988	13 17 14
D, E, F	Middle row	1,010 1,034 1,026	5 9 5
G, H	Bottom row	995 975	8 7
		8)7958	78

995 mean average.

Combustion Chamber.

Setting No. 1	1,230° C.
" 2	1,375 "
" 10	1,335 "
" 11	1,340 "
" 12	1,320 "
" 13	1,395 "
	6)7,995

1,332.5 mean average.

No. 2 Retort House—8-Hour Charges.

Retorts.		Degs. C.	No. of Readings Taken.
A, B	Top row	1,000 1,041	40 11
C, D	Third row	981 1,004	26 32
E, F	Second row	972 954	11 85
G, H	Bottom row	976 961	11 43
		8)7,889	259

986 mean average.

The following are supplementary notes by Mr. Bell:

It is by the courtesy of the Carbonizing Committee that the results of the recent investigation into the working of horizontal retorts with full charges are placed before the members, and they may perhaps be of interest as a supplement to the paper the author had the privilege of contributing to the Institution last year.

Before the advent of incandescent burners flame luminosity was of much greater importance than it is to-day; hence the production of gas of high illuminating power was then of primary consideration. To this end, thin charges quickly burnt off were found to give the results desired. However, the conditions regarding the supply of town's gas have during the last few years undergone a considerable change. Flame luminosity is of much less importance, and the problem now is to supply the greatest number of heat units, at the lowest possible cost, in such a form as is most suitable for the requirements of consumers who use in increasing quantities gaseous fuel for light, heat and power. No doubt one of the essential conditions of efficient carbonization is the production of as large a quantity of gas as possible—due consideration being given to other factors—of a reasonable candle power, nowadays generally found suitable and satisfactory to consumers when it is from 14 to 17 candles, tested by the "Metropolitan" No. 2 burner, and of a calorific value of (say) 500 to 550 B.T.U. net per cubic foot. This does not mean an attenuated, weak, or diluent mixture containing a high percentage of useless and harmful non-combustible gases.

The investigations carried out by the author strengthen and confirm the belief that, under the changed conditions briefly referred to, many advantages are obtainable by carbonizing in filled retorts with a longer period of distillation. There is a decided increase in the quantity of gas evolved, though the flame luminosity is somewhat lower. But there is a much less proportionate reduction in the calorific value of the gas than in the candle power.

Referring to Table II., which is a summary of the results obtained from a seven days' continuous trial under ordinary working conditions with Derbyshire gas coal (Blackshale seam), there will be seen the make of gas and its illuminating power taken every half hour and comprising 336 observations and tests. The calorific value of the impurities is the average of 84 tests, taken alternately each hour on No. 1 and No. 2 retort-house gas at the Litchurch works. It is of interest to observe that similar coal, with heavier charges and a lengthened period of distillation, gave 12,091 cubic feet of gas of 15.5-candle power, with a calorific value of 554 B.T.U., whereas with lighter charges and shortened period of distillation, the gas made was 11,820 cubic feet of 16·29-candle power—being approximately three-

quarters of a candle power less. But the calorific value is lower; being 530 B.Th.U., compared with 554 B.T.U. net for the higher quality of gas. These results confirm those obtained by others working in the same direction, and they indicate that there is no strict relation between candle power and calorific value, even when the former is ascertained by the "Metropolitan" No. 2 test-burner, which deals fairly with gases of varying candle power.

The author is indebted to Dr. Coleman for pointing out, since the issue of the report, that the calculations of calorific values, as ascertained from analyses of the gases, do not agree with those given in Table II.; and that the figures in Table III. appear to be too high by about 7 per cent. A test for aqueous vapor contained in the gas supplied to the town at a temperature of 22° C. gave 1.95 per cent. by volume. Dr. Colman has been good enough to supply the figures from the results of some recent investigations made in respect to the calorific values of various gases per cubic foot measured moist at 60° F. and 30 inches of the barometer, these being the conditions to which the gas is corrected in direct estimation of the calorimeter. From this it would appear that the calculated calorific values from the composition of gases do not quite agree with those actually obtained and given in Table III., which are the average results of 84 tests by the Junkers calorimeter. The analysis of the composition of the gas obtained from No. 1 and No. 2 retort houses is the average of three tests of samples taken at the rate of half a cubic foot per hour into the 10 cubic foot test holder on alternate days, the samples being drawn from same into gas sample tubes, which later were analyzed by the Orsat gas apparatus.

The sampling and testing of gases, although done by an experienced chemist, are difficult matters, and one need not be surprised if the results are not strictly in agreement. The value of investigation work appears to the author to be to give those actually obtained, while discarding results that are obviously inaccurate. Dr. Colman gave on the preceding day the results of his latest investigations in respect of the calorific value of moist gases at 60° F. and 30 inches barometer.

The complex organic compounds which form coal are broken up by the heat prevailing in the interior of the retorts, and during the first few hours of distillation more active gasification takes place, due to the decomposition of the more volatile hydrocarbon matters into gases more or less stable in accordance with the temperature employed. Generally speaking, the higher the temperature that prevails, within reasonable limits, the more completely will those gaseous products first evolved be converted into permanent gases. The destructive decomposition of coal in a hot retort is most complex and requires further scientific investigation. The gases evolved, and more especially the hydrocarbon series, are split up and new combinations are formed. These again vary by mutual affinities and reactions of the products, producing an almost endless variety.

Contact for longer or shorter periods with the highly heated surfaces of the retorts plays a most important part, and it is now recognized that prolonged contact is generally attended with injurious results. There is good reason to believe, so far as the production of ammonia is concerned, that the shorter the period of contact with the heated surface of the retort, the less will this valuable by-product be decomposed, and with filled retorts there is an increase in the production of ammonia, and also a decided increase in the quantity of tar, which is lighter and more liquid.

As regards impurities, sulphuretted hydrogen is so easily and cheaply eliminated by oxide purification that little importance need be attached to its presence in the crude gas; but it is otherwise in respect to bisulphate of carbon, which is a most troublesome and costly impurity to remove. All desire to send out gas containing as little sulphur impurity as possible; and, from observation, the author is inclined to the belief that high heats, with more drastic carbonization, do not materially affect its production. But there is no doubt that coal containing a high percentage of sulphur means that the resulting gas will be high in sulphuretted hydrogen and bisulphide of carbon. By using a similar grade and kind of coal, but containing less pyrites, it has been found possible to reduce the bisulphide of carbon by more than half, working otherwise under exactly similar conditions. Much may be done by careful selection of the coal carbonized. Special emphasis should be laid on this—that all coal for gas making should be well cleaned from pyrites and other refuse.

All gas works should, as far as possible, take the fullest advantage of their geographical position in respect to the coal fields. It has been found that, by carbonizing in field retorts with a longer period of distillation, inferior grades of coal, which happen to be near, can be profitably used for gas making, which formerly were discarded in consequence of their inferiority in regard to coking properties, as by modifying carbonizing conditions a saleable coke can be produced. There is no doubt that more consideration is now being given to this most important of all by products of gas manufacture—and fixed residue of coal distillation - that forms so large and valuable a product.

In the quenching of hot coke an excessive quantity of water should be avoided, otherwise quality is deteriorated. It should be borne in mind that its inflammability depends to some extent on the moisture it contains, as well as its size and shape, and an excess of moisture further reduces its effective calorific value.

An extension of the time of distillation produces a harder and less friable coke. That which is in contact with the walls of the retort is hardest, and it gradually decreases in hardness towards the center of the charge. The crumbling or friability is contingent on the hardness and closeness and size of the pores. It is always, of course, more or less porous in formation, the pores being the passages through which the volatile products issue.

It may be of interest to note that the temperatures given in Table IV.—average mean retort temperature of 995° C., and the combustion chambers temperature of 1,332° C.—are both between 5 and 6 per cent. higher than the mean of the maximum and minimum temperatures given early in the report of the Committee on Refractory Materials.

Duties and Liabilities of Gas Companies to Public with Reference to Supply of Gas. Validity and Effect of Regulations of Gas Companies.

[Prepared for the JOURNAL, by MR. JOHN EDSON BRADY, Attorney-at-Law.]

In some jurisdictions it has been held that a gas company, in the absence of statute or contract, is under no greater legal obligation to accommodate persons applying for service than a corporation or individual engaged in the business of selling provisions, clothing or other articles of trade. It may select the persons with whom it will deal and refuse to furnish gas to those with whom, for reasons of its own, it does not wish to deal.

Thus, in Connecticut it has been held that the right to be supplied with gas, in the abseuce of any statute on the subject, depends upon contract. McCune *v.* Norwich City Gas Company, 30 Conn., 521. The plaintiff, in his brief, stated that he desired to be supplied with gas and that he was willing to abide by all reasonable rules and regulations, but that, notwithstanding his request to be furnished with gas light, the Company, without justifiable cause, refused to accommodate nim. The plaintiff alleged no contract under which the Company was obligated to serve him, and the court held that it was only by virtue of a contract that the plaintiff could rightfully demand to be served. Said the court: "We discover no reason for subjecting the maker of gas to duties or liabilities beyond those to which the manufacturers and vendors of other commodities are subjected by the rules of law." There is a Massachusetts decision to the same effect. In the decision referred to it was said "No public duty is imposed upon them, nor are they charged with any public trust. They are authorized to make and distribute gas for their own profit and gain only. They are not bound to sell and dispose of it to anyone, either for public or private use or consumption. It is entirely at their own option whether they will exercise their corporate rights and privileges at all; and if they undertake to manufacture and dispose of gas, the extent to which they shall carry on the business is left to their own election." Commonwealth *v.* Lowell Gas Company; 12 Allen (Mass.), 75.

Duty of Company to Furnish Gas in Absence of Statute.—But the weight of authority is to the effect that, even where there is no controlling statute, a gas company is under an obligation to furnish gas to all who make necessary preparations to receive it and who are ready to pay for it, and willing to abide by the reasonable rules and regulations of the company. This obligation is imposed by the Courts as a sort of return for the rights and privileges granted to the company by the public.

The Duty of a Gas Company to Furnish Gas to All Applicants for Service.—Respecting this it has been said: "It is within the everyday experience of us all, and hence within the judicial knowledge of the Court, that the manufacture and supply of inflammable gas for the purpose of lighting cities, stores and dwellings is not a domestic or family manufacture. It is carried on either by public or associated capital and is dependent for its profit upon general consumption. Cor-

porations of this kind are not like trading or manufacturing corporations, the purview of whose operations is as extensive as commerce itself, and whose productions may be transported from market to market throughout the world. Their product is designed for the consumption of the immediate community in which the manufacture is wrought. It is not a trading corporation, for its product depends exclusively upon home consumption. If gas were an article of merchandise, and could be bottled or packed up and imported or exported, like 'soap, candles or hats,' to be distributed to the various markets of commerce, there might possibly be claimed for it the character of merchandise. But such is not the fact. * * * From the nature of the article, the objects of the company, its relations to the community, it is to me apparent that the company is not at all analogous to an ordinary manufacturing or trading corporation." Shepard *v.* Milwaukee Gas Light Co., 6 Wis., 539.

Company Bound Without Statute.—A writ of mandamus was issued against the defendant gas company in the case of State *v.* New Orleans Gas Company, La., 32 So. Rep., 179. The Company had been in the habit of furnishing gas for fuel purposes at 50 per cent. of the rate charged for illuminating gas, the gas in each instance being the same, but the reduction in the case of fuel gas being made because of the greater amount of gas consumed. Patrons who used gas for both purposes were fitted out with two sets of pipes and two meters. The plaintiff in this instance had been using gas for illuminating purposes and he wished to discard that use of it and use it as fuel exclusively. This the Company refused to permit him to do unless he first should have installed an extra set of pipes. The plaintiff objected to the installation of the extra set of pipes on the ground that he needed but one; and, the Company remaining firm in the stand it had taken, he petitioned for a writ of mandamus. It appeared that where a patron was supplied with two sets of pipes the Company would permit him to plug up one set and discontinue its use, or even to remove it entirely. This, it was held, was clearly inconsistent with the position it had assumed toward the plaintiff, and it was compelled to furnish fuel gas to him without the installation of an extra set of pipes.

Company Required by Statute to Furnish Gas.—Many States have adopted statutes, under which gas companies are compelled to furnish gas to all applicants who comply with the requirements of the statute. In enacting these statutes the intention is, in view of the privileges enjoyed by gas companies, to prevent them from arbitrarily refusing to furnish gas and from cutting off the supply without reasonable cause. The uncertainty of an action for breach of contract, and the impossibility of proving definitely the amount of damage sustained, furnish some of the considerations which the legislatures acted upon in passing these statutes. While a company might never intentionally play the part of a despot in the matter of refusing to furnish gas, the legislature felt that, in cases of personal differences, which necessarily arise from time to time between a company and its customers, the temptation to close the argument by cutting off the gas supply might prove more than the officers of the company, being only human, could withstand.

The New York statute, which is known as Section 62 of the Transportation Corporations Law, provides as follows: "Upon the application, in writing, of the owner or occupant of any building or premises within 100 feet of any main laid down by any gas light corporation, or the wires of any electric light corporation, and payment by him of all money due from him to the corporation, the corporation shall supply gas or electric light as may be required for lighting such building or premises, notwithstanding that there be rent or compensation in arrears for gas or electric light supplied, or for meter, wire, pipe or fittings, furnished to a former occupant thereof, unless such owner or occupant shall have undertaken or agreed with the former occupant to pay or to exonerate him from the payment of such arrears, and shall refuse or neglect to pay the same; and if, for the space of 10 days after such application, and the deposit of a reasonable sum, as provided in the next section if required, the corporation shall refuse or neglect to supply gas or electric light as required, such corporation shall forfeit and pay to the applicant the sum of $10, and the further sum of $5 for every day thereafter during which such refusal or neglect shall continue: provided that no such corporation shall be required to lay service pipes or wires for the purpose of supplying gas or electric light to any applicant where the ground in which such pipe or wire is required to be laid shall be frozen, or shall otherwise present serious obstacles to laying the same; nor unless the applicant, if required, shall deposit in advance with the corporation a sum of money sufficient to pay the cost of his portion of the pipe or wire required to be laid, and the expense of laying such portion."

The statute was never intended to provide a means for unreasonable persons to recover penalties from companies willing and anxious to serve them. Andrews *v.* North River Electric Light and Power Company, 23 Misc. Rep. (N. Y.), 512. The defendant was an electric light and power company carrying on business in the City of New York. The plaintiff, residing on an avenue in New York City on which the Company's wires were strung, served on the defendant Company on June 10, 1896, the following written notice: "In compliance with the statutory provision I hereby demand that you supply me, at my office, 729 Tremont avenue, New York City, with electric light and power at once." On the same day the defendant replied to this communication in the following words: "How many lights and how much power do you want?"

To this the plaintiff never replied. His next move was on July 11, when he commenced an action for the penalty mentioned in the statute. Now, the statute reads that gas and electric companies must furnish all the light and power *required* by the applicant, and the Court held that this cast upon the applicant the obligation of specifying his requirements, and that there was no duty on the defendant to furnish light or power until the applicant should so specify.

"The justice of this rule," said the Court, "is apparent when we consider the fact that one man may think one light is all he requires, while another, for lighting the same premises, may think that 100 are none too many. Besides, for the purpose of permitting the defendant to fix the cash deposit, which it may require from the applicant under the statute in question, the number of lights and power required should be named, because how else may the defendant fix such charge? As we view the act under consideration, the plaintiff has failed to establish herein a cause of action against the defendant, because of his refusal to furnish in writing, as required by the defendant, the number of lights and power required by him in his premises."

Distance from Main.—The New York statute requires gas companies to furnish gas to the occupants of "any building or premises within 100 feet of any main laid down by any gas light corporation."

In the case of James *v.* Rochester Gas and Electric Company, N.Y. App. Div., 461, it was held that where the building in which an office is located is within 100 feet of the gas main, it is immaterial that the office of an applicant for gas, located in the building, is more than 100 feet distant. Gas must be supplied under the statute, for the statute refers to the building in which the office is located rather than to the office itself.

Introduction of Other Means of Lighting as a Defense.—One whose place is equipped with electric lighting apparatus cannot compel a gas company to maintain pipes and meter in his establishment so as to enable him to fall back on the gas in case of accident to the electric lighting system. This proposition was held in Fleming *v.* Montgomery Light Company, Ala.; 13 So. Rep., 618. The consumer filed a bill for the purpose of enjoining the Company from removing its gas meter from his premises and "from refusing to furnish your orator gas." The Company, in 1852, had entered into an agreement with the City of Montgomery, by the terms of which it was granted the exclusive right and privilege of manufacturing and supplying gas for a period of 50 years to the City of Montgomery and its inhabitants. On its part the Company agreed "at all times to supply the inhabitants of the City of Montgomery for private use with a sufficient quality of gas of the most approved quality." It appeared that the consumer at one time had used gas entirely, but at the time of the bringing of this action he was using electric light furnished by another company. His contention was that, although he had made other arrangements for light with a different company, yet it was the duty of the defendant Company to keep on hand gas, with proper meters and connections, to supply him with light "in case of accident" to the company from which he was purchasing electric light; and this, too, without any corresponding obligation on his part to use any of the gas which he desired the defendant to keep in readiness for his consumption. The Company was permitted to remove its meter. In the language of the Court, there was "No equity or equality in such a proposition," as the consumer advanced.

Effect of Non-Payment of Gas Bill.—It is generally held, and is sometimes provided by statute, that a gas company may refuse to supply a consumer with gas on the ground that gas already consumed has not been paid for; but a gas company cannot defend its refusal to furnish gas on the ground ha a former tenant of the premises has

moved out and left his gas bill unpaid. In Miller *v.* Wilkes-Barre Gas Company, Penn., 55, Atl. Rep., 974, Miller became the tenant of premises known as Farr's Hotel. When he took possession the former tenant was in arrears on his gas bills to the extent of $15.73. Miller himself, during the first month of his occupancy, used $9.02 worth of gas. This he was willing to pay, but he refused to square the account of the tenant who preceded him. The Company then removed its meter, and for 11 months Miller used oil lamps to light his hotel. He then brought suit against the Company for damages. It was held that the Company had no right to demand that Miller pay the former tenant's bill, but a judgment in favor of the plaintiff was reversed on appeal because of the insufficiency of his testimony. The verdict was for $2,500, or about $7 a day, during the period for which damages was claimed. Miller testified that, while he burned gas his gross receipts were $20 to $22 a day, except on Saturdays, when he averaged $65. By lamp light he claimed to take in only half as much. Sixty per cent. of what he took in, he said, was profit. This was obviously guesswork, for it appeared that he kept no books and had no bank account, and that he put into his pocket whatever money came in. He was unable to tell the exact amount taken in on any one day of the 11 months during which he burned oil. This evidence, according to the Appellate Court, was not sufficient to warrant the jury in assessing damages against the Gas Company.

In 1894 a dispute arose between the Rochester Gas and Electric Company and one of its patrons as to whether or not the latter should pay the Company a bill of 84 cents for 600 feet of gas which escaped through a gas log on the plaintiff's premises. The customer claimed that the gas escaped through the negligence of the Company's employees, to which the Company answered by removing the meters and turning off the gas. The customer then brought an action against the Company to recover the penalty prescribed by the statute, claiming the sum of $10 and the further penalty of $5 for each of 132 days during which the Company had refused and neglected to supply him with gas.

Considerable evidence was given during the trial concerning the 600 feet of gas which escaped from the gas log and which the plaintiff claimed he ought not to be obliged to pay for. The jury were instructed that the matter turned on the question whether the plaintiff owed the Company any money at the time he applied to the Company to have the supply of gas restored; whether the plaintiff was justly indebted to the Company for the 600 feet of gas which escaped. They found that he was not and brought in a verdict for $575 in his favor, which was affirmed on appeal. The case is that of Jones *v.* Rochester Gas and Electric Company, 7 N. Y. App. Div., 465.

(To be Continued.)

Interesting Legal Opinions
RESPECTING GAS PRACTICE.

[Prepared for the JOURNAL, by MR. JOHN EDSON BRADY, Attorney-at-Law.]

Right of Gas Company to Charge Meter Rent.—The Supreme Court of Alabama has held that a gas company, having a franchise requiring it to supply gas to consumers at a price not exceeding a certain specified sum per 1,000 cubic feet, is not entitled to charge consumers a meter rent where they do not use more than a specified amount of gas during any month. The plaintiff brought a mandamus proceeding to compel the defendant Gas Company to furnish him gas in accordance with the rates fixed by a municipal ordinance. Sec. 4, of the ordinance, which the Company had accepted, provided that the Company should "at all times supply the inhabitants of the city with gas for lighting and heating purposes," at prices not exceeding $1.62 per 1,000 cubic feet for lighting purposes and not exceeding $1.08 per 1,000 cubic feet for heating and other purposes. There was no provision in the ordinance with reference to meters, and the question at issue between the parties was whether the Company was authorized to charge consumers $1 a month as meter rent where they failed to consume $1 worth of gas during the month. The decisions on this point are not in absolute harmony, but it will be found that the cases generally, which justify such a charge, are based upon ordinances or contracts differently worded from the ordinance here involved. By statute gas companies are sometimes expressly required to provide a gas meter for every consumer. But, in the absence of statute, it has been held that the obligation of a gas company to supply a dwelling or place of business with gas, and for that purpose to install a supply pipe and meter, is subject to the limitation that there shall exist a reasonable expectation that the consumption of gas shall be sufficient to warrant the preliminary expenditure. It must be admitted that, upon general principles, it is reasonable and just to allow a company to make a charge of $1 per month for meter rent, where the amount of gas consumed is so small as to cause the company to furnish gas at a loss. But in this particular instance the ordinance constituted the charter of the Company, and the contract between the Company and the city was made for the benefit of the consumers. The agreement of the Company was to furnish gas at certain rates, and it could only mean that all means and instrumentalities necessary to furnish it at these rates should be provided by the Company at its own expense. The Company might adopt any means, suitable and accurate, for ascertaining the number of feet of gas consumed, and the customer could not dictate or direct what means should be used, his only concern being that he should receive the service, and not be charged more than the rate fixed by law. The court was without power to alter the contract between the Company and the city, and read into it a clause permitting the charging of meter rent. If the Company had desired the privilege of collecting rentals for meters in certain instances it should have seen to it that the right to do so was provided for in the ordinance before it accepted it. "It will not do to say," said the court, "that the charge fixed was only for the gas and does not refer to the meter. The meter belongs to the Company and is placed there by it in order that it may ascertain how much gas is being consumed." The Company was accordingly required to furnish gas to the plaintiff, in spite of his refusal to pay the monthly rental assessed for the use of the meter. In another and similar case it was aptly said: "Presumably the Company was aware, when it obtained its charter and established its monopoly, that there would be smaller consumers, as well as large ones, and there would be less profit in furnishing the one class than the other; but it did not on that account reject the charter, or obtain the right to add to the price of the small consumer's bill." In all fairness a gas company should be allowed to make a rental charge such as the one which was here attempted to be imposed. But, as said above, it was a matter which should have been provided for in the ordinance. Montgomery Light and Water Power Company; Supreme Court of Alabama, 51 So. Rep., 726.

Gas Company Enjoined as a Nuisance.—A plant for the manufacture of gas does not constitute a nuisance *per se*. The manufacture of gas in or near a great city, for illuminating and heating purposes, is not only legitimate, but it is necessary to the comfort and convenience of the people. But in this, as in any other sort of lawful business, the person conducting it is subject to the rule that he must so use his property as not to injure others, even where operating under municipal permission or under public obligation to furnish a commodity. Under this theory of law an artist, by the name of Judson, brought a proceeding to enjoin a gas company from continuing its operations in the vicinity of his dwelling and studio and for damages sustained. The plaintiff's property was located on the bank of the Arroyo Seco, in the city of Los Angeles, Cal., about 900 feet distant from the defendant's gas works. Judson testified that nearly every day since the erection of the gas works, at night, as well as during the hours of daylight, he had noticed offensive odors, and that the annoyance had gradually increased. Vari-colored smoke was emitted from the works, which was occasionally so dense as to obscure the landscape for a period of from 20 minutes to an hour. Speaking of the noises which came from the gas works, he testified: "The noises that I complain of consist of a continuous roaring sound and occasional explosions. The roaring is almost continuous, and the explosions are frequent. The roaring sounded like the rumbling of a train, and the explosions sometimes like a shot out of a pistol, sometimes like a shotgun, sometimes like an explosion of dynamite, and again as though it were a large mass of gas that made a much heavier explosion, but not so sharp. I heard these explosions sometimes frequently and sometimes there would be quite a period when they did not occur. These noises disturbed my sleep at night. The members of my family were also disturbed by these noises." As a result of the action the defendant company was enjoined from operating its plant and the plaintiff wns awarded $700 in damages. It was held to be immaterial that the discomfort caused by the defendant's works was not constant, owing to periodical cessation of the work, variation in the direction of the wind, and the like. In another case, based upon somewhat similar facts, it was said: "I am not aware of any authority or established principle, holding that a clear, unmistakable nuisance, which it is intended to commit periodically, will be per-

mitted because it does not exist the greater portion of the time, but only for a small portion of it. This court will not determine that a family shall have their dwelling house made uncomfortable to live in for 12 hours, once in 2 weeks, or that they shall protect themselves by closing the house tightly and remaining indoors for that time. It is surely no justification to a wrongdoer that he takes away only $\frac{1}{2}\frac{1}{5}$ of his neighbor's property, comfort or life." It was also held to be immaterial that the plaintiff did not prove actual damage to his house, or the herbage on his land, or to the rental or vendible value of his property; for, in the very nature of things, "the amount of detriment sustained is not capable of exact pecuniary computation." Judson *v.* Los Angeles Gas Company, Supreme Court of California, 106 Pac. Rep., 581.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

963,821. Mantle Tying Apparatus. E. Skriwan, Vienna, Austria-Hungary.

963,910. Support for Inverted Incandescent Mantles. J. T. Lister, Cleveland, O., assignor to the Cleveland Gas Mantle and Supply Company.

964,036. Mantle Making Process. C. M. Lungren, Bayonne, N. J., assignor to Safety Car Heating and Lighting Company.

964,405. Gas Heating Stove. J. E. Davis, Ironton, O.

964,415. Method of Producing Hydrogen from Water Gas. A. Frank, Charlottenburg, Germany.

964,493. Bracket for Combination Electric and Gas Fixtures. J. D. Coder, Elizabeth, N. J.

964,611. Gas Burning Attachment for Stoves. A. Clausing, Milwaukee, Wis.

964,719. Gas Purifier. C. Wegescheidt, Cologne-Bayenthal, Germany.

964,804. Gas Regulator for Bunsen Burners. F. S. Parker, Meriden, Conn., assignor to Edward Miller & Company, same place.

964,832. Apparatus for Manufacturing Heating and Illuminating Gas. M. P. Wynne and S. P. Wagley, Fort Worth, Tex.

964,901. Process of Treating Combustible Gases. H. L. Doherty, New York city.

964,956. Meter Prover. R. L. Dezendorf, Richmond Hill, N. Y., assignor to American Meter Company, New York city.

965,045. Regulating Device for Feed Conducts of Gas Burners. E. Steil, Berlin, Germany, assignor to Berlin-Anhaltische Maschinenbau-Actien Gesellschaft, Abteilung XII., Berlin, Germany.

965,057. Manufacture of Incandescent Mantles. A. G. Adamson, London, England, assignor to himself and D. M. Still & Sons, Limited, same place.

965,086. Gas Producer. R. P. Conklin, San Luis Potosi, Mexico.

965,100. Water Heater. O. Fox, Cleveland, O., assignor to Natural Gas Regulator Company, same place.

965,102. Means for Lighting and Extinguishing Gas Lamps. A. Giorgi, Florence, Italy.

965,147. Extraction of Tar and Tar Constituents from Gases. W. Feld, Honningen-on-the-Rhine, Germany.

Items of Interest
FROM VARIOUS LOCALITIES.

ONE of the items in the plea for divorce, instituted by Mrs. A. Genevieve Doyle, of Detroit, Mich., from her husband, C. A. Doyle, which case was recently on trial before Judge Murfin, was this: "My husband is so stingy with the gas bills, that I always went to my mother's home to take a bath!" That is pretty close to the record.

MR. R. E. SCHURTZ, of Alamogordo, N. M., who has been granted the right to construct and operate a gas plant in Taylor, Tex., declares that he will be ready to supply gas to the residents of Taylor by December 1st. He proposes to act as Manager of the Taylor Company when it is ready for actual business.

AT the annnal meeting of the Bridgeton (N. J.) Gas Light Company the following result was reached: Directors, Daniel Bacon, John Smalley, S. P. Fithian, W. C. Mulford and B. H. Minch; President, Daniel Bacon; Superintendent and Treasurer, Benjamain F. Harding; Secretary, W. C. Mulford. The correspondent who furnishes us with this note incloses the following further mention: "The annual reports of the directors and officers showed an excellent state of the Company's finances, while the plant is shown to be one of the most complete in the State. The service is excellent, and the increased consumption of gas here is remarkable."

MESSRS. H. M. BYLLESBY & CO., whose purchase of the plant of the Grand Forks (N. D.) Gas Company has heretofore been reported, have made overtures to the city to take over the public lighting thereof, which is now largely done by a municipally supported electric lighting system that is far from being up to date.

MR. EDWARD B. BENNETT, President of the Hartford City (Conn.) Gas Light Company, replying to a question asked by a reporter on one of the Hartford newspapers as to whether or not the Company was to be sold, or had been sold, to the Doherty syndicate of this city, said: "Reports of the sale of the Gas Light Company are without foundation. If the Company had been sold we would be the first to know about it. It is true that we are going to get rid of the holding concern (the Hartford Gas Securities Company) and a special meeting of that concern has been called for the 18th inst. to confirm the vote of the Directors to distribute 29,966 shares of the common stock of the Gas Light Company and have the corporate existence of the Securities Company terminated. We know nothing whatever about any sale of the Gas Light Company and do not credit any reports to that effect."

THE plant of the New Britain (Conn.) Gas Light Company has been hooked up to the piping system recently put in and through the streets of the Berlin district.

THE proprietors of the Fitchburg (Mass.) Gas and Electric Light Company have ordered that the rate for electric current be reduced to 12 cents per kilowatt hour, as against the prevailing rate of 14.4 cents.

AT a meeting of the Directors in the Cooperstown (N. Y.) Gas Company, held about a fortnight ago, it was decided to advance the selling rates to these figures: On illuminating account, $2 per 1,000; on fuel account to $1.50 per 1,000. The former figures were, respectively: $1.75 and $1.35.

THE Atlanta (Ga.) Gas Light Company is doing some effective work in distilling its tar and in the disposition thereof, mainly through judicious advertising done through channels that reach the cotton planters, etc., of the South. For instance, in the *Southern Ruralist*, for July, ¼ column is taken up with a short description of the varieties of products in this line that can be made available by farmers and other residents in the rural districts—the especially listed derivatives being, "Creosote," "Shingle stain," "Pitch" and "Road Tar." This paragraph descriptive of the uses to which it may be, and is being put, is worth reproducing, since its lines appeal in common sense way directly to the thought of large consumers of the material. Here it is: "Creosote is the best known preservative for wood. Wooden fence posts dipped in creosote will not rot. Mortised joints and wooden framework of barns, etc., especially of floor beams and joists near the ground, when thoroughly soaked in creosote before erecting, will last for years. Cart and wagon framework when saturated with creosote will not decay. The wooden posts of farm machinery, especially of plows, etc., should be protected with creosote. Write for full particulars. As the "Creosote" description is, so are the others dealing with "Shingle Stain."

MESSRS. FORSTALL & ROBISON, Engineers, New York city, have awarded the contract for a new 36-inch ammonia concentrator, with mechanical line mixer and the necessary other miscellaneous parts, to the Gas Machinery Company, Cleveland, O. The concentrator noted is to be erected on the works of the City Gas Company, Norfolk, Va.

That the Minneapolis (Minn.) Gas light Company is living up to the statutory requirements of the franchise under which it is supplying gas in that city would seem to be borne out by the tabulated returns for June. These represented 2 readings on each account per diem: Candle power, average, 22.21, or 3.21 candles above the requirement; testing value, 610.2, or 10.2 above.

The Pacific Gas and Electric Company is proposing to extend its main system from Vallejo to the well-known tannery town of Benecia.

The plant and franchise of the New Castle (Ind.) Light, Heat and Power Company has been taken over by a Philadelphia syndicate. The change having been effected by Mr. P. J. Bagot, representing the Petry Company, of Chicago and Detroit. Mr. M. O. Straight and Mr. H. L. Olds will remain in charge of the plant locally.

The Public Service Corporation, of New Jersey, has at last secured control of the Princeton (N. J.) Light, Heat and Power Company. Mr. Frank Bergen has been elected President, and Mr. Henry C. Stevenson succeeded Mr. George Whitfield Betts as Secretary. Mr. Richard Stockton hangs over as Treasurer and General Manager.

Mr. C. H. Marshall has resigned from the service of the Western Gas Construction Company.

The Greenville (O) Gas Company has filed a certificate that its capital stock has been increased to $200,000, an addition of $150,000.

The Wallace-Fyfe syndicate report the successful starting of the plant for the supply of gas to the Gogebic County (Mich.) towns of Ironwood and Hurley. Gas was turned on as a fitting number for the 4th of July celebrations in the named places. New services, to the number of 50, were put in operation since the supply was commenced.

At the annual meeting of the Tiverton (R. I.) Gas Company the following Board of Directors was elected: Arthur Ellwood, J. A. Donnelly, Wm. Hodgson, G. L. Church, H. C. Osborn, B. F. Kellogg and W. C. Hindle, Jr.

On the 20th ult. the proprietors of the Auburn (N. Y.) Gas Company, filed with the Public Service Commission, Second District, a statement to the effect that the Company cannot keep the agreement, made with the city of Auburn in 1907, to reduce the price of gas in that city to-day to $1 per 1,000 cubic feet. The base of the finding is that the increased cost of material and labor makes it a losing proposition. The ruling net rate is $1.08.

"N. L. M.," writing from Carthage, N. Y., under date of July 26th., incloses the following: "Talk of a gas plant here has been revived in positive manner lately, and those in the know declare that the project is now a close certainty. Mr. W. R. Clark, of Watertown, who holds the franchise for Carthage, has been interesting local capital, and his success has been such that estimates for construction account will be asked for before mid-August. It is likely, too, that provision will be made to extend the system to West Carthage."

Mr. Arthur M. Hart, who has been General Manager of the Hannibal (Mo.) Gas Company for some time, has accepted the post of General Manager to the Rochester (Minn.) Company.

Mr. M. L. Laselles forwards the following from Deadwood, S. D., under date of July 26th.: "When the Lead-Deadwood Gas Company resumes operation (which will be within a few days) the gas supply of the two cities will be operated under a new franchise. The City Council, by ordinance regularly submitted, granted the Company a new agreement which is to be operated for a term of 20 years. Under it the Company may increase its net selling rate to $1.50 per 1,000 cubic feet. The former net rate was $1.30.

To-night the Selectmen of Mansfield, Mass., will consider the application of the proprietors of the Norfolk and Bristol Gas and Electric Company, for the right to extend the main system to and through the streets of Mansfield.

The Common Council, Troy, N. Y., some days ago adopted an ordinance authorizing the Mayor to abrogate the present contract for the public supply of the city with the Troy Gas Company, which, under its limitations, does not expire until June 1, 1911. Under this new agreement the rate will be fixed at $1 per 1,000, instead of $1.10 as at present, and there will be a corresponding reduction in the cost of gas to the city. The action on the ordinance followed the reading of this communication from Mayor Mann: "The desirability of securing a reduction in the price of gas in this city to $1 per 1,000 from $1.10, the present price, has recently resulted in the preliminary negotiations with the Troy Gas Company for a new contract with it. The present contract expires next year. Under it the price for electric lights is 26 cents per light per night, or $94.90 per year. The Company has agreed to cancel the present contract and enter into a new one whereby the price for gas for all consumers will be $1 per 1,000 cubic feet and for each electric light 24 cents per night, or $87.60 per light per year. The Company also will so improve the lighting of the Broadway approach that for the present price it will furnish lamps of double the present illuminating power. I believe it is for the interests of the city that a new contract should be made according to these terms. The result to the city of Troy will be as follows: There will be saved to the city each year on gas used by it in the public offices about $500. There will be saved each year on say 720 electric lights, $5,256. To private consumers there will be a saving of 10 cents per 1,000 cubic feet of gas consumed. In addition to this, the franchise tax assessment for the year 1910 has been fixed at $1,050,000, whereas four years ago it was $630,000. The tax levied upon this assessment goes into the city treasury and from this source, in case the assessment is sustained by the courts, there will be an additional revenue to the city of at least $7,140 per year. Four years ago there was secured from the Troy Gas Company a reduction of $24.64 per electric light per year. This, added to the present reduction, makes a total reduction of $31.94 per light per year, I recommend the careful consideration of the proposed ordinance on the subject."

At the annual meeting of the shareholders of the Taunton (Mass.) Gas Light Company the following directors were elected: W. T. Slope, Ezra Duval, W. C. Davenport, John Browne and F. L. Tinkham.

The authorities of Holyoke, Mass., are using the many gallons of tar produced in the municipal gas works for keeping down the dust on roads and for use as a binder in new roads' construction.

A party named E. H. Hartley is proposing to secure a franchise from the authorities of New Albany, Ind., for the operation there of a gas and electric lighting plant. Here is the Hartley game—and an old one it is: * * * "Mr. Hartley stated * * * that the new company was ready to incorporate with a capital of $100,000, and that the completion of the organization depends upon whether the company—embryonically in esero—is awarded the contract for lighting the streets of the city. * * * And that the new company will agree to furnish gas to private consumers at the rate of 80 cents per 1,000 cubic feet, and electric light at 15 per cent. less than the present prices."

The Gas Machinery Company, of Cleveland, O., is under contract to install a water gas apparatus in the plant of the Helena (Ark.) Gas Company. The contract for this apparatus was placed for prompt completion, and as the machinery was shipped within 3 weeks from date of contract, it looks that both the letter and spirit thereof were observed.

We are in receipt of a copy of Bulletin No. 126, recently issued by the Bristol Company, which illustrates and explains Class II. of the Company's recording thermometers. Among the interesting things given is an actual temperature record in a sulphite pulp digester, and another interesting item is the reproduction of records of temperature in a rubber vulcanizer, as regards the feedwater supply thereof. The Company reports that the volume of business coming to it is very satisfactory.

The Marlboro-Hudson Electric Company's business headquarters are now in the offices occupied by the Marlboro-Hudson Gas Company, the former having succeeded in getting control of the latter corporation.

Mr. W. H. Brown has resigned the Secretaryship of the Peoria (Ills.) Gas and Eleetric Company, in order to assume charge of the Grand Forks (N. D.) Gas and Electric Company.

The Market for Gas Securities.

More skyrocketing in Consolidated last week, only it was all sticks and no stars. Because a pool in certain classes of railroad shares was almost at the point of having to let go the mess, prices of all sorts of securities played the Jack-and Jill act, mainly as to the finality thereof. The result was Consolidated sold down to 122¾ on Wednesday. To-day the "potted" or "pooled" shares, having been taken over by a Hebrew syndicate, Consolidated sold back to 128¼—this was the rate at noon of Friday. The Company declared a regular quarterly dividend of 1 per cent. yesterday, payable in mid-September.

Other shares are noticeably higher, Peoples having recovered to 105 and Lacledes to 97½. Brooklyn Union, which broke to 124, recovered to 131.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

AUGUST 1.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$73,177,000	100	128⅛	128¼
Central Union Gas Co.—1st 5's, due 1927, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	130¼	131
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106⅜	107
Yonkers	299,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	⅛	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	85
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,000,000	-	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	106	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	97¼	97½
Preferred	2,500,000	100	90	100
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	79¾	80
Preferred	25,000,000	100	90½	91
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	104¾	105
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—1st Mtg. 5's	751,000	1,000	100	102
Washington (D. C.) Gas Co.	1,600,000	200	375	380
1st Mortgage, 6's	600,000	—	—	—

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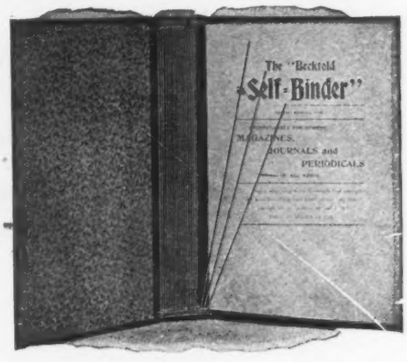

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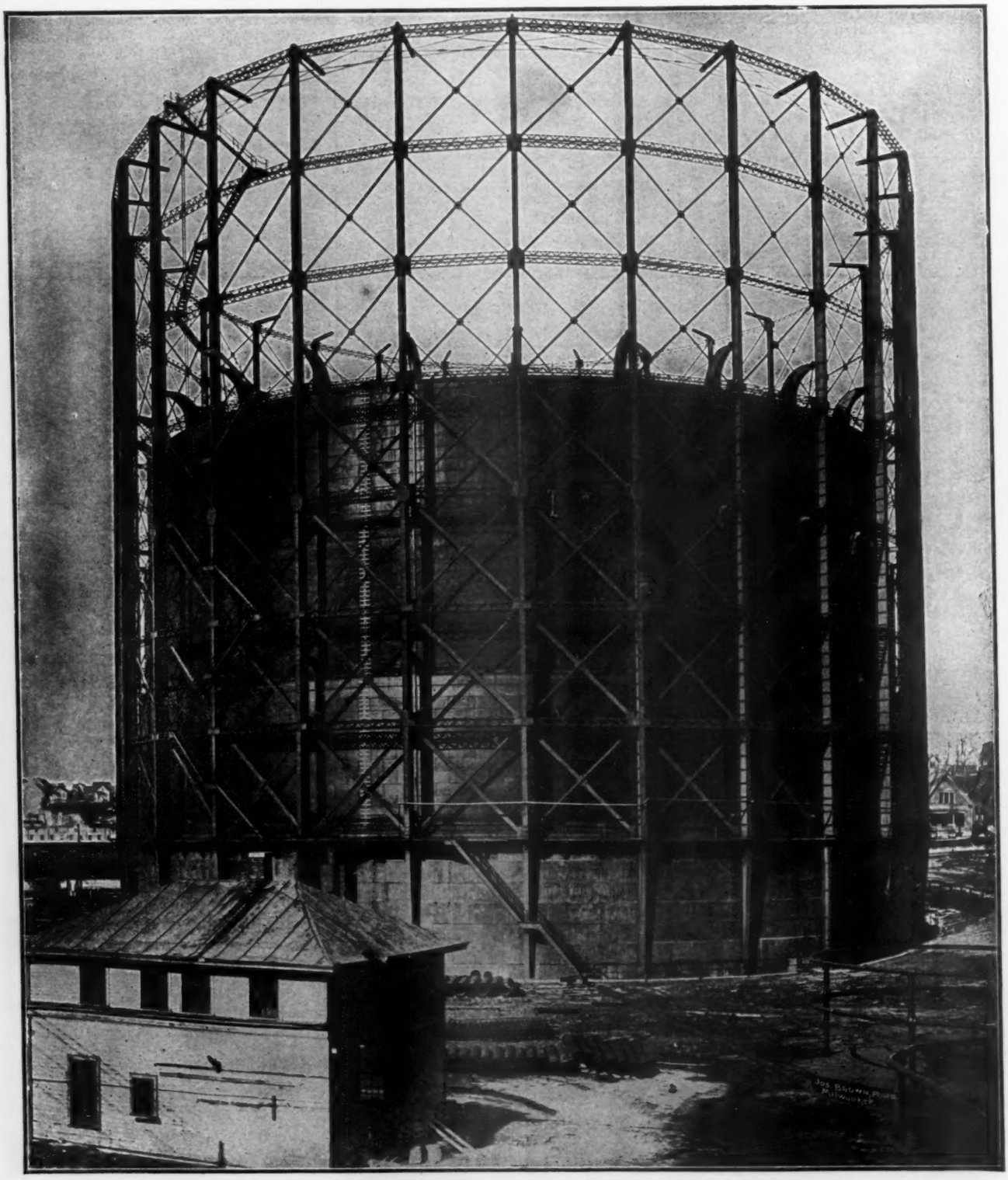

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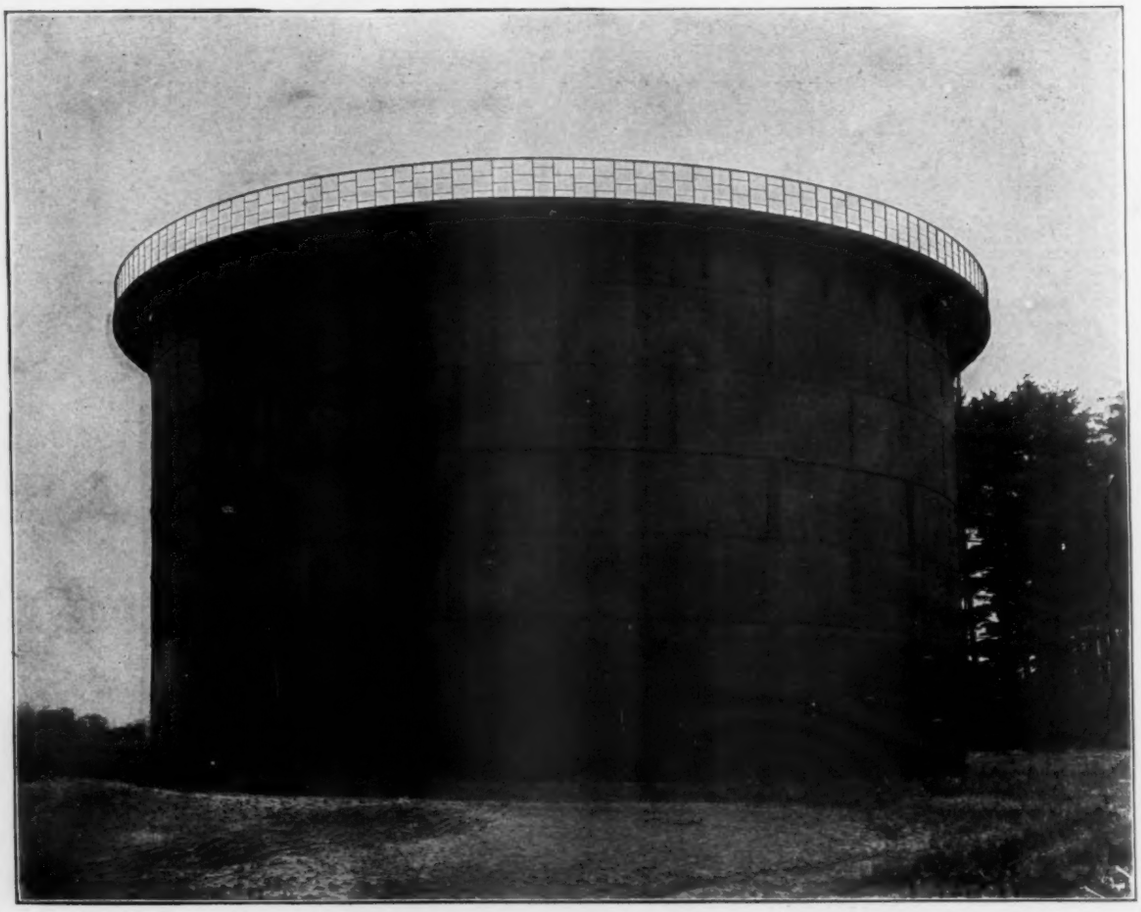

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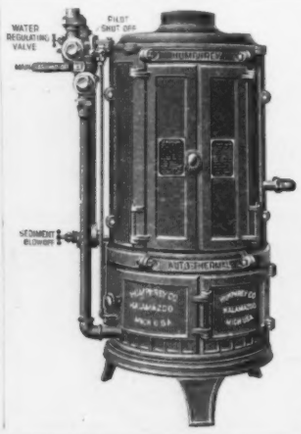

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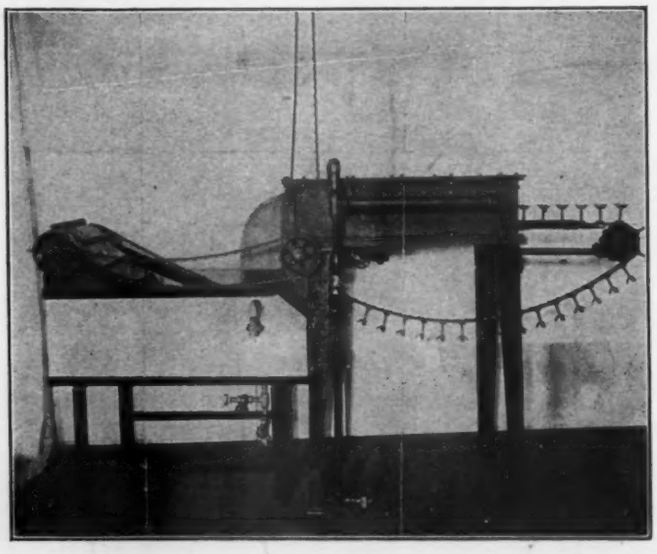

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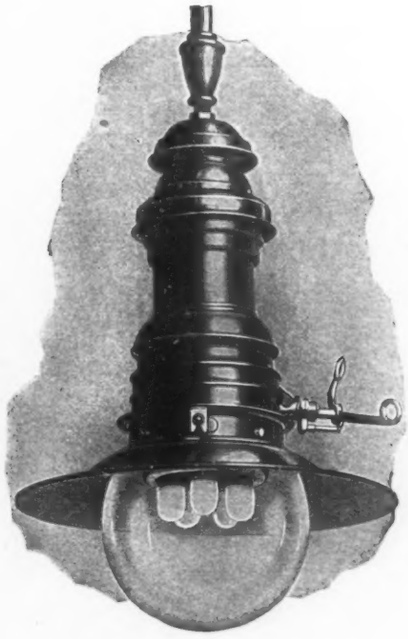

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CRESTON, IA.
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DAYTON, O.
DECATUR, ALA.
DELRAY, MICH.
DETROIT, MICH.
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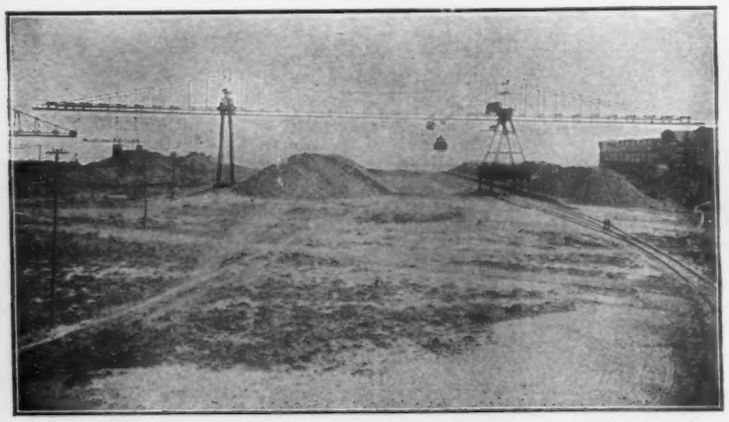

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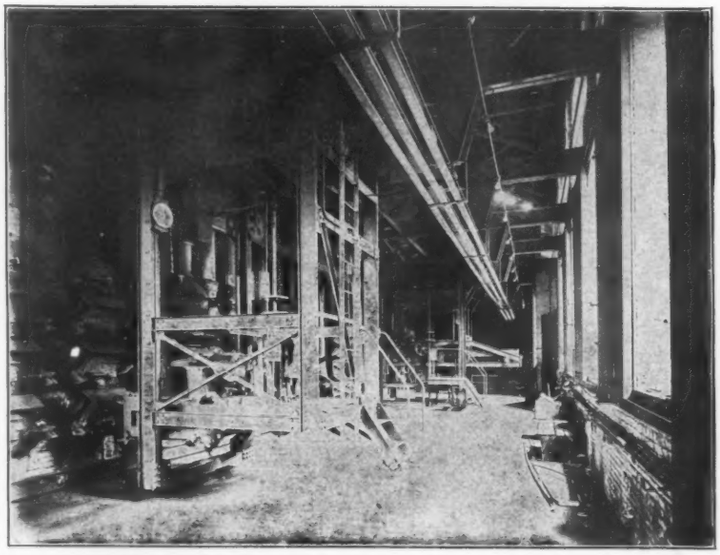

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911, ————————. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Baltimore, Md., Oct. 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President, S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 9 to 12, 1910; Aboard Boat, "Georgian Bay." Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1911: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O, Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, Feb. 16, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May, 1911, ———— Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

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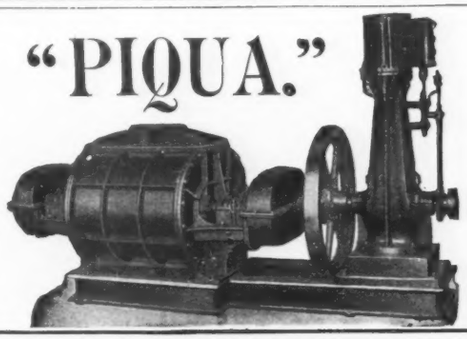

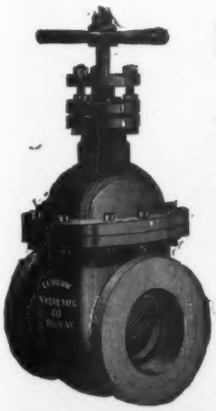

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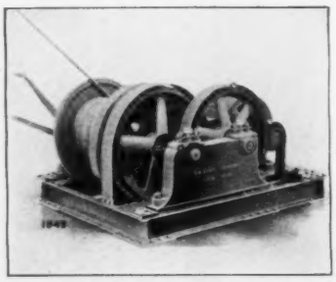

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PUBLIC LIGHTING TABLES FOR AUGUST, 1910.

[COMMUNICATED BY THE AMERICAN METER COMPANY.]

Table No. 1.
FOLLOWING THE MOON.

Day of Week.	Date.	Light.	Extinguish.
		P.M.	
Mon.	1	7.40	4.00 A.M.
Tue.	2	7.40	4.00
Wed.	3	7.40	4.00
Thu.	4	7.40 N.M.	4.00
Fri.	5	7.40	4.00
Sat.	6	7.40	4.00
Sun.	7	7.40	4.10
Mon.	8	7.40	4.10
Tue.	9	7.40	4.10
Wed.	10	8.00	4.10
Thu.	11	9.20	4.10
Fri.	12	9.50 F.Q.	4.10
Sat.	13	9.20	4.10
Sun.	14	10.50	4.10
Mon.	15	10.30	4.10
		A.M.	
Tue.	16	12.30	4.10
Wed.	17	1.30	4.10
Thu.	18	2.30	4.10
Fri.	19	No L.	No L.
Sat.	20	No L. F.M.	No L.
Sun.	21	No L.	No L.
Mon.	22	7.20 P.M.	9.10 P.M.
Tue.	23	7.20	9.40
Wed.	24	7.20	10.10
Thu.	25	7.20	10.30
Fri.	26	7.20	11.10
Sat.	27	7.20 L.Q.	11.50
Sun.	28	7.10	12.40 A.M.
Mon.	29	7.10	1.30
Tue.	30	7.10	2.40
Wed.	31	7.10	4.30

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in 1 Hour.	Complete Extinguishing in 50 Minutes.
		From Time Given.	
		P.M.	A.M.
Mon.	1	7.02	3.27
Tue.	2	7.02	3.27
Wed.	3	7.02	3.27
Thu.	4	7.02	3.27
Fri.	5	7.02	3.27
Sat.	6	6.57	3.37
Sun.	7	6.57	3 37
Mon.	8	6.57	3.37
Tue.	9	6.57	3.37
Wed.	10	6.57	3.37
Thu.	11	6.57	3.37
Fri.	12	6.57	3.37
Sat.	13	6.47	3.47
Sun.	14	6.47	3.47
Mon.	15	6.47	3.47
Tue.	16	6.47	3.47
Wed.	17	6.47	3.47
Thu.	18	6.47	3.47
Fri.	19	6.47	3.47
Sat.	20	6.37	3.52
Sun.	21	6.37	3.52
Mon.	22	6 37	3.52
Tue.	23	6.37	3.52
Wed.	24	6.37	3.52
Thu.	25	6.37	3.52
Fri.	26	6.37	3.52
Sat.	27	6.27	3.57
Sun.	28	6.27	3.57
Mon.	29	6.27	3.57
Tue.	30	6.27	3.57
Wed.	31	6.27	3.57

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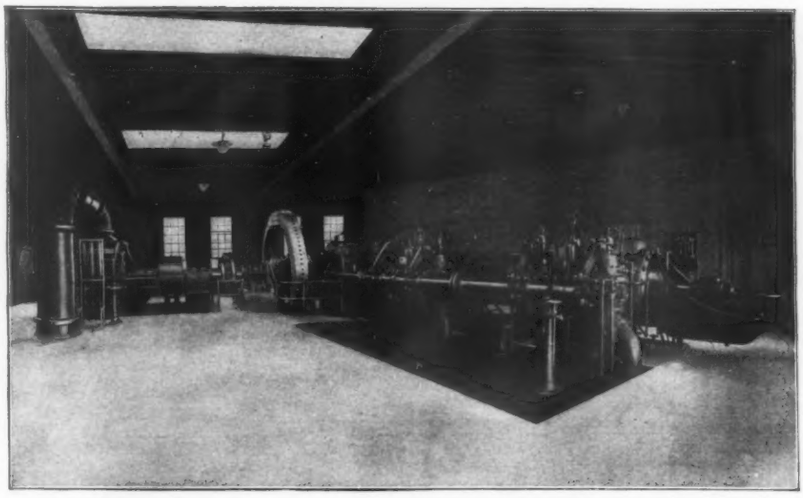

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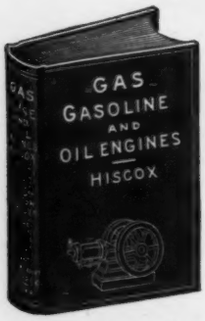

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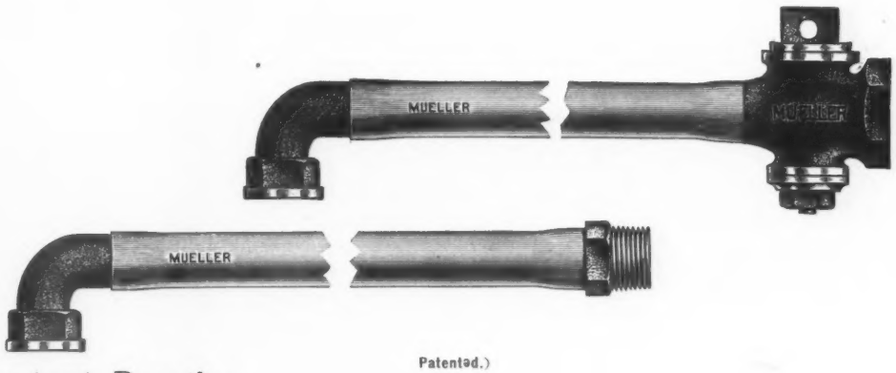

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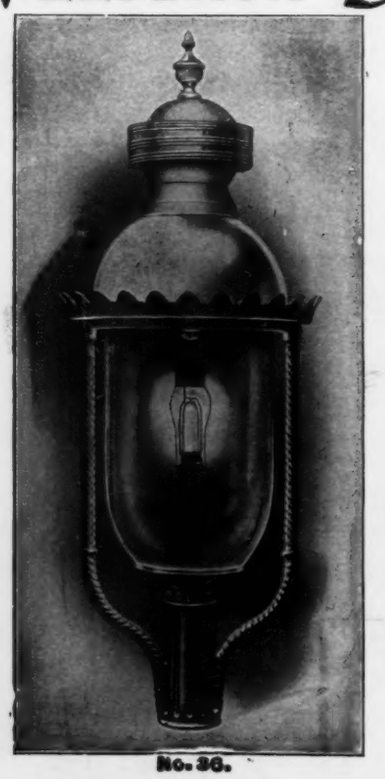

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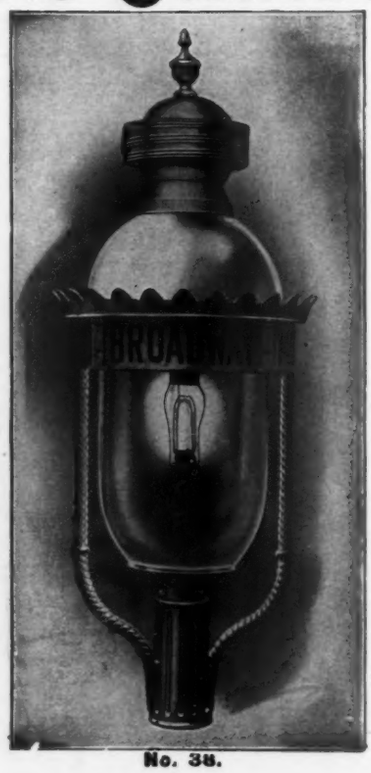

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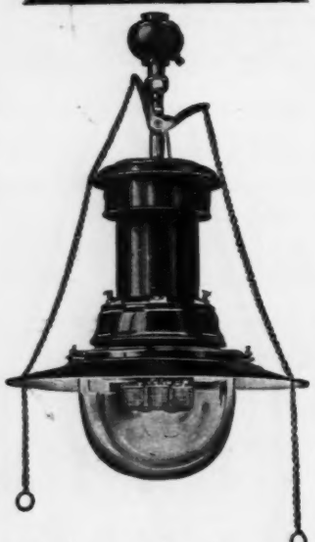

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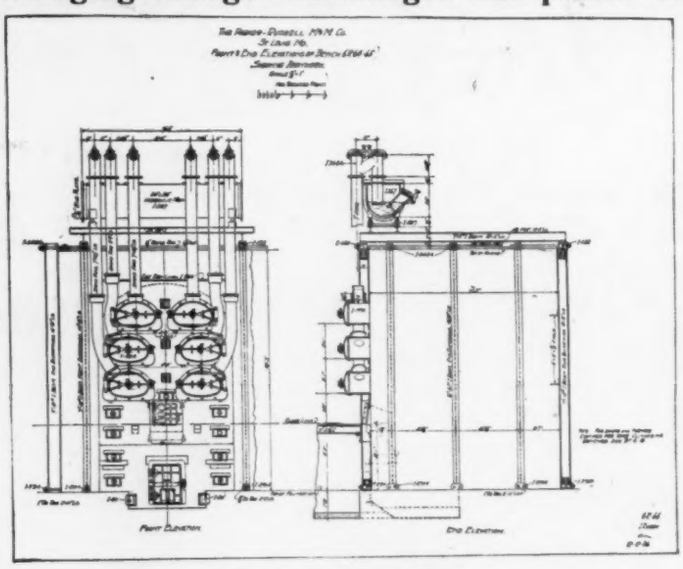

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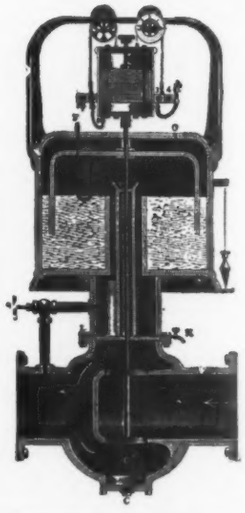

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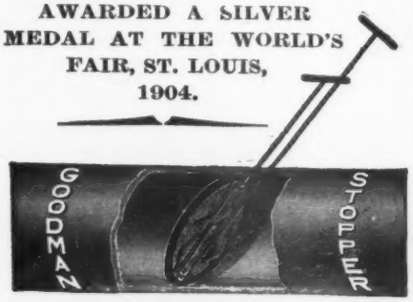

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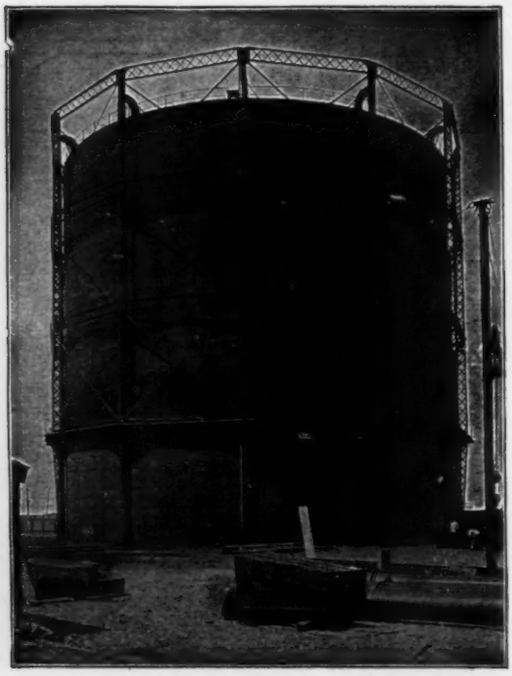

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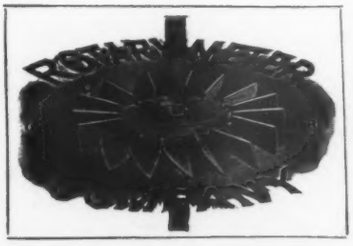

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Manufacturers of

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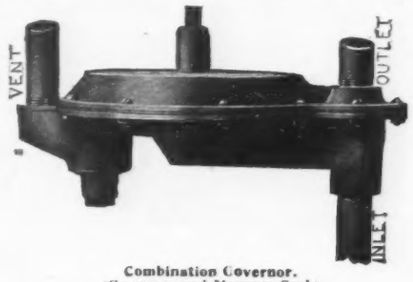

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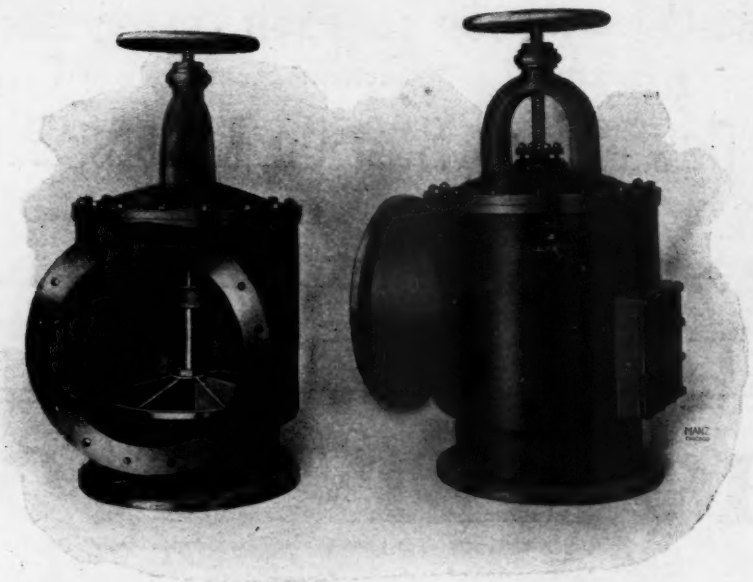

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